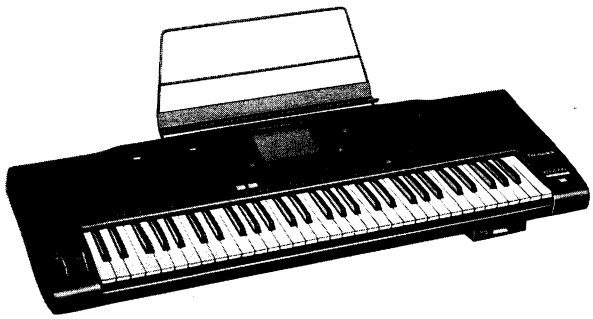
ORDER NO. EMID931438
A5

Service Manual

PCM Keyboard

SX-KN2000



(M), (MC), (XM), (EN), (EH), (EF), (EZ), (EW), (EA), (EP), (EK), (XL), (XR), (XS), (XD), (X)

AREAS

(M):	U.S.A.	(EK):	the United Kingdom
(MC):	Canada	(XL):	New Zealand
(XM):	Mexico	(XR):	Australia
(EN):	Norway, Sweden, Denmark, Finland	(XS):	Malaysia, Singapore, South Africa
(EH):	Holland, Belgium	(XD):	Saudi Arabia, Kuwait
(EF):	France, Italy	(X):	the Middle East, Indonesia, Hong Kong, the Philippines, Thailand, Taiwan
(EZ):	Germany		
(EW):	Switzerland		
(EA):	Austria		
(EP):	Spain, Portugal, Greece		

Specifications

KEYBOARD	61 KEYS (WITH INITIAL TOUCH)
SOUND GENERATOR	PCM
MAXIMUM NUMBER OF NOTES PRODUCED SIMULTANEOUSLY	64 NOTES
SOUNDS	250 SOUNDS GROUP: PIANO & E PIANO, HARPSI & MALLET, GUITAR, SPECIAL PERC, STRINGS & VOCAL, ORGAN & ACCORDION, BRASS, REED, FLUTE & ETHNIC, SYNTH LEAD, BASS, SYNTH PAD, KEYBOARD PERC, PERC & EFFECT
EFFECTS	DIGITAL EFFECT, DSP EFFECT, SUSTAIN, DIGITAL REVERB
PART SELECT	RIGHT 1, RIGHT 2, LEFT
TRANSPOSE	G–C–F♯
RHYTHM	200 RHYTHMS GROUP: 8 BEAT 1, 8 BEAT 2, 16 BEAT, JAZZ ROCK & SOUL, FUNK & LATIN ROCK, DANCE POP, BIG BAND & SWING, ROCK (OTHERS), JAZZ COMBO, U.S. TRAD, MARCH & WALTZ, TRAD DANCE, LATIN 1, LATIN 2
CONTROLS	MAIN VOLUME, BALANCE, CONDUCTOR, START/STOP, INTRO & ENDING, FILL IN 1, FILL IN 2, VARIATION, COUNT INTRO, SYNCHRO & BREAK, TEMPO/PROGRAM, SPLIT POINT
MANUAL PERCUSSION	1, 2, 3
BACKGROUND SOUND	BIRD, WAVE, RAIN, CHURCH BELL, APPLAUSE, FADE OUT
AUTO PLAY CHORD	ONE FINGER, FINGERED, PIANIST, MEMORY, DYNAMIC ACCOMP, MUSIC STYLE ARRANGER
ONE TOUCH PLAY	○ (ONE TOUCH PLAY/MUSIC STYLE SELECT)
TECHNI-CHORD	○
PANEL MEMORY	3 BANKS × 8, SET
SEQUENCER	16 TRACKS STORAGE CAPACITY: APPROX. 19000 NOTES INPUT MODES: EASY RECORD, REALTIME RECORD, STEP RECORD FUNCTIONS: TRACK ASSIGN, EDIT (SONG CLEAR, TRACK CLEAR, VELOCITY CHANGE, QUANTIZE, TRACK MERGE, MEASURE ERASE, MEASURE COPY), PUNCH RECORD, PLAY, MEDLEY
COMPOSER	5 TRACKS: BASS, ACCOMP 1, ACCOMP 2, ACCOMP 3, DRUMS STORAGE CAPACITY: APPROX. 8600 NOTES INPUT MODES: REALTIME RECORD, STEP RECORD FUNCTIONS: MODE SELECT, COPY, LOAD SINGLE COMPOSER PATTERN, BEND RANGE MEMORY: 2 BANKS × 6
MEMORY & CONTROL	INITIAL, DISK LOAD, DISK SAVE, MIDI FILE LOAD, MIDI FILE SAVE, FOOT SWITCH & PAD SETTING, DISK FORMAT, LOAD SINGLE COMPOSER PATTERN, LOAD SINGLE SOUND MEMORY
SOUND SETTING	SOUND SETTING (VOLUME, SUSTAIN, DIGITAL EFFECT, PAN, KEY SHIFT, TUNING, PITCH BEND RANGE, PEDAL SETTING), OVERALL TOUCH SENSITIVITY, MASTER TUNING, TECHNI-CHORD TYPE, LEFT HOLD, REVERB, DSP EFFECT, REVERB & DSP EFF PART SETTING, PAD SOUNDS
SOUND EDIT	EASY EDIT, GENERAL EDIT (OCTAVE SHIFT, VIBRATO, AUTOBEND & TRILL, MODULATION, DISTORTION, CONTROLLERS, SOUND REVERB), TONE EDIT (TONE, LEVEL, ENVELOPE, ENVELOPE KEY FOLLOW, FILTER), EFFECT EDIT MEMORY: 2 BANKS × 18
MIDI	BASIC CHANNEL, CONTROL MESSAGE, PART SETTING, REALTIME MESSAGES, COMMON SETTING& P.MEM OUTPUT, MIDI PRESETS, INPUT/OUTPUT SETTING, SYSEX BULK DUMP, GENERAL MIDI

Technics

EXTERNAL MEMORY	DISK DRIVE
DISPLAY	LCD (320 x 240 DOTS) DISPLAY ANGLE, CONTRAST, EXIT, DISPLAY HOLD
HELP	O
DEMO	O
TERMINALS	PHONES, LINE OUT (R/R+L, L), AUX IN (R/R+L, L), FOOT SW 1, 2, EXP PEDAL, MIDI (IN, OUT, THRU)
OUTPUT	18 W x 2
SPEAKERS	14 cm x 2, 6.5 cm x 2
POWER REQUIREMENT	110 W, 100 W (CANADA), 80 W (NORTH AMERICA AND MEXICO)
	AC120/220/240V 50/60 Hz AC120V 60Hz (NORTH AMERICA AND MEXICO) AC230V 50/60Hz (NEW ZEALAND AND EUROPE EXCEPT FOR UNITED KINGDOM)
DIMENSIONS (WxHxD)	104.4 cm x 14.6 cm x 37.6 cm (41-3/32" x 5-3/4" x 14-13/16")
NET WEIGHT	13.2 kg (29.1lbs.)
ACCESSORIES	MUSIC STAND, AC CORD

Specifications are subject to change without notice for further improvement.

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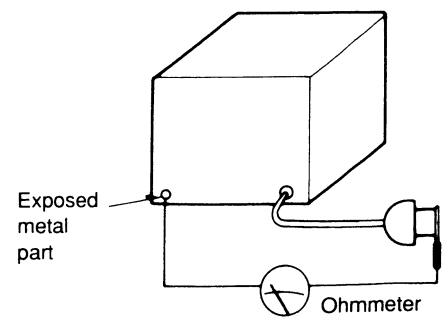
SAFETY PRECAUTION (This "safety precaution" is for the U.S.A. only)

• Safety Precaution

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only the manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

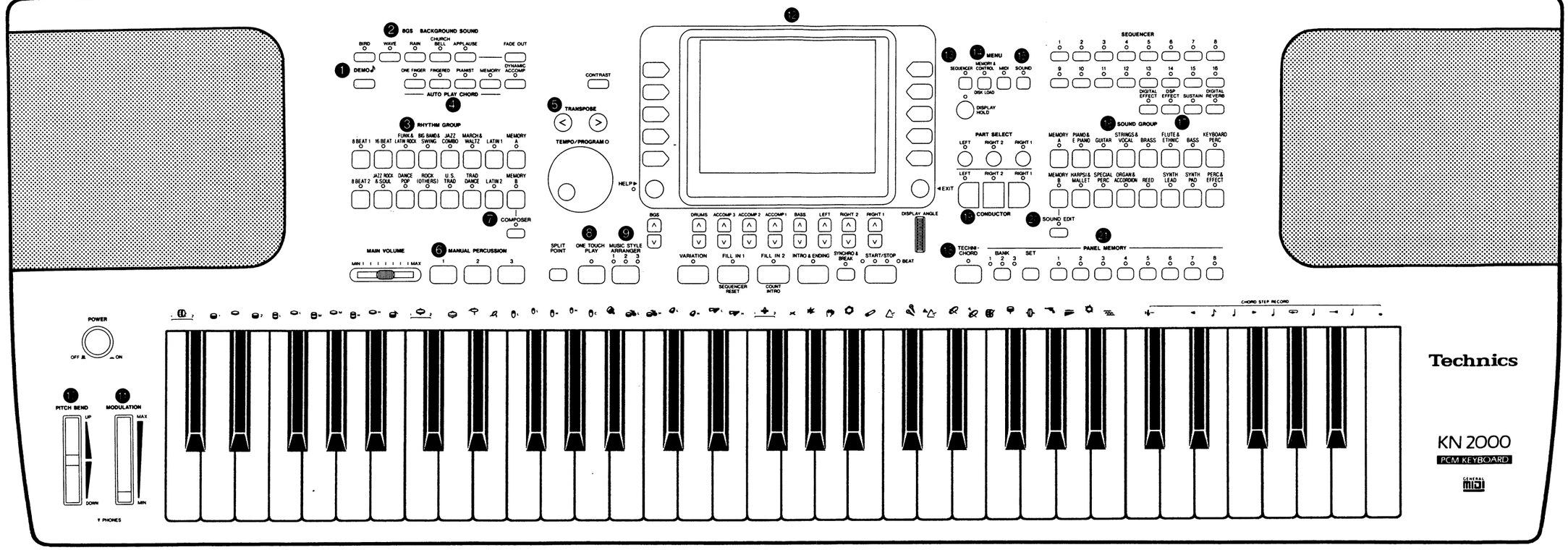
• Insulation Resistance Test

1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with an ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screw heads, connectors, control shafts, handle brackets, etc. Measurements should range from 4 MΩ to infinity for all exposed parts.



Resistance=4 MΩ to ∞

ARRANGEMENT OF CONTROL PANEL



BASIC FUNCTIONS

1 DEMO ♪

Pre-recorded performances are used to demonstrate the individual appeal of the rhythms, sounds and other features.

2 BACKGROUND SOUND (BGS)

Five unique background sounds add special life and interest to your performance. The **FADE OUT** button is pressed once for slowly diminishing background sound, twice for immediate cut-off. The volume is adjusted with the **BGS** buttons.

3 RHYTHM GROUP

Various rhythm patterns are available for each rhythm group. Other rhythm controls are **START/STOP**, **SYNCHRO & BREAK**, **INTRO & ENDING**, **COUNT INTRO** and **FILL IN 1** and **2**. The volume is adjusted with the **DRUMS** balance buttons below the display.

4 AUTO PLAY CHORD

This feature is activated when the **ONE FINGER**, **FINGERED** or **PIANIST** button is turned on. An automatic accompaniment appropriate for the selected rhythm is produced when you play a chord. **MEMORY** allows you to continue the accompaniment even after the chord keys are released. The volume for each part of the **AUTO PLAY CHORD** (**DRUMS**, **BASS**, **ACCOMP 1**, **2**, **3**) is adjusted with the respective balance buttons below the display.

5 TRANSPOSE

C is the standard setting, but you can raise or lower the key of the entire instrument with these two buttons. The transposed key is shown on the normal performance display.

6 MANUAL PERCUSSION

The three buttons are used to add percussion sounds during your performance. The desired **KEYBOARD PERCUSSION** sounds are easily stored in the buttons. The buttons can also be programmed for other functions, such as rhythm start/stop.

7 COMPOSER

Create original rhythm patterns, either in realtime or with the step record method, or modify preset rhythms. Store up to 12 new rhythms in the reserved memory locations and recall them as you play, just like the preset rhythms.

8 ONE TOUCH PLAY

Select a rhythm and press the **ONE TOUCH PLAY** button until the panel settings change. The sounds and effects perfect for the selected rhythm are automatically set in seconds. Or press the **ONE TOUCH PLAY** button briefly to access the MUSIC STYLE SELECT display. Choose one of the many music styles and the appropriate sounds, effects and even rhythm are set instantly.

9 MUSIC STYLE ARRANGER

A tap of a button during your performance changes the rhythm and sounds to a simpler or flashier arrangement to match the feeling of the music.

10 PITCH BEND

This wheel is moved up or down with your hand to create a continuous change in pitch. The wheel returns to the center position automatically when it is released.

11 MODULATION

Add vibrato to the sound by turning the wheel upwards.

12 DISPLAY (LCD screen)

Displays performance information, function settings and other messages.

- Use the **DISPLAY ANGLE** wheel to set it to the angle at which it is easiest to read.
- Use the **CONTRAST** button to adjust the display so that it is easy to read.

13 SEQUENCER

With this feature you can separately play and record the parts for an entire song. Then have the whole ensemble performance played back automatically. This is a true 16-track sequencer, with full realtime recording, step recording and editing features.

14 MEMORY & CONTROL

The settable functions in this mode include initialization, foot switch and PAD button function-assignment, and settings related to Disk Drive operation.

15 SOUND

This button is used for making the various sound, volume and effect settings for each part, as well as tuning and **TECHNI-CHORD** type, by reading the display.

16 SOUND GROUP

Various sounds are available for each sound group.

17 Effects

Turn the **DIGITAL REVERB** button on to add reverberation to the sound. **DIGITAL EFFECT** gives the sound a thickness and diffusion. The **DSP EFFECT** changes the quality of the sound. When **SUSTAIN** is on, the musical tones fade gradually after the keys are released.

18 TECHNI-CHORD

Chord notes played on the left section of the keyboard are added to melody notes played on the right section. Choose from four harmonic styles.

19 CONDUCTOR

These buttons allow you to assign a different sound to each part, and then assign the desired part to the entire keyboard, assign a different part to each section of the keyboard, or mix parts. When the keyboard is divided into sections, change the dividing point with the **SPLIT POINT** button.

20 SOUND EDIT

Modify preset sounds to create new and unique sounds.

21 PANEL MEMORY

Set up the sounds and effects, and then store them in these 24 memories (3 BANKS × 8 memory locations) buttons for instant recall as you play. You can expand the range of storable settings to include the rhythm selection, tempo setting and more.

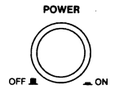
Disk Drive

This Disk Drive allows you to store up to 20 **SEQUENCER** performances and other data on a 3.5-in. 2DD memory disk.

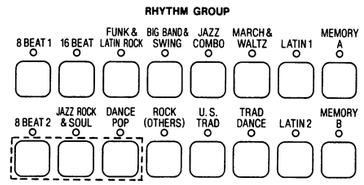
INITIAL SETTING

■ The initial setting function is used to return to the original factory settings, and to reset the customer settings and misoperations.

1. Press the **POWER** button to turn off the instrument.

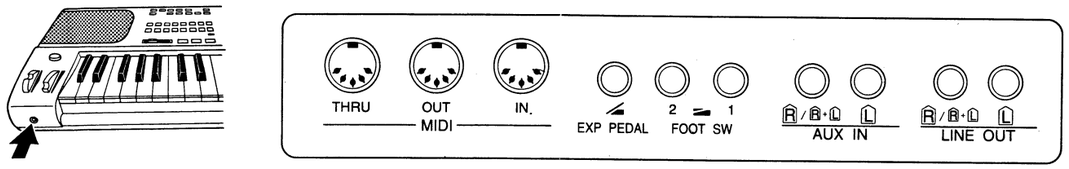


2. While pressing the three leftmost buttons in the **RHYTHM GROUP** section (**8 BEAT 2**, **JAZZ ROCK & SOUL** and **DANCE POP**) at the same time, turn the **POWER** button on again.



NOTE:
All stored data in the **SEQUENCER** and **COMPOSER** and other settings are initialized with this operation.

OPTIONS AND CONNECTIONS



(on the rear panel)

PHONES ( ) (Use headphones with over 16Ω impedance.)
For silent practice headphones may be used. When plugged in, the speaker system is automatically switched off, and sound is heard only through the headphones.

MIDI (Musical Instrument Digital Interface)
MIDI is the standard specification that enables connection to equipment such as synthesizers and personal computers. Data transmission and reception are possible between the Technics Keyboard and other instruments provided with MIDI terminals.

IN: The terminal that receives data from external equipment.
OUT: The terminal that transmits data from this instrument to external equipment.
THRU: The terminal that transfers data from the **IN** terminal directly to other equipment.

- Use a 5-pin DIN cord (less than 15m long) for these connections.

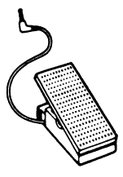
EXP PEDAL
The optional SZ-E2 Expression Pedal can be connected to this terminal to control the volume.

FOOT SW 1, 2
The optional SZ-P1 Foot Switch can be connected to this terminal to control various functions.

AUX IN (input level 0.5 Vrms, 6 kΩ)
Other instruments such as a sound generator can be connected to this terminal, and the sound will be output from the Keyboard's speakers. To receive monaural sound, connect the other instrument to the **R/R+L** terminal. (Do not connect the **L** terminal.)

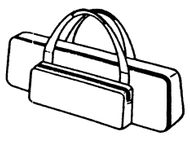
LINE OUT (output level 1 Vrms, 600 Ω)
By connecting an external high-power amplifier, the sound can be reproduced at a high volume. To output monaural sound, connect the external equipment to the **R/R+L** terminal. (Do not connect the **L** terminal.)

- **Options**

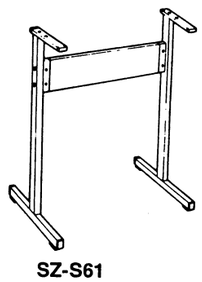


SZ-E2
Expression Pedal

SZ-P1
Foot Switch



SZ-B7
Carrying Bag

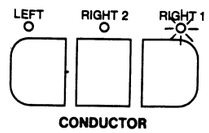
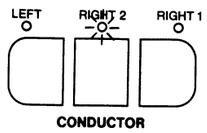
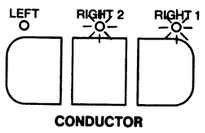
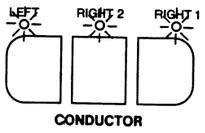
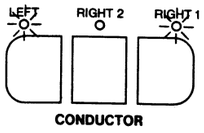
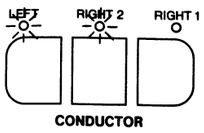


SZ-S61
Keyboard Stand

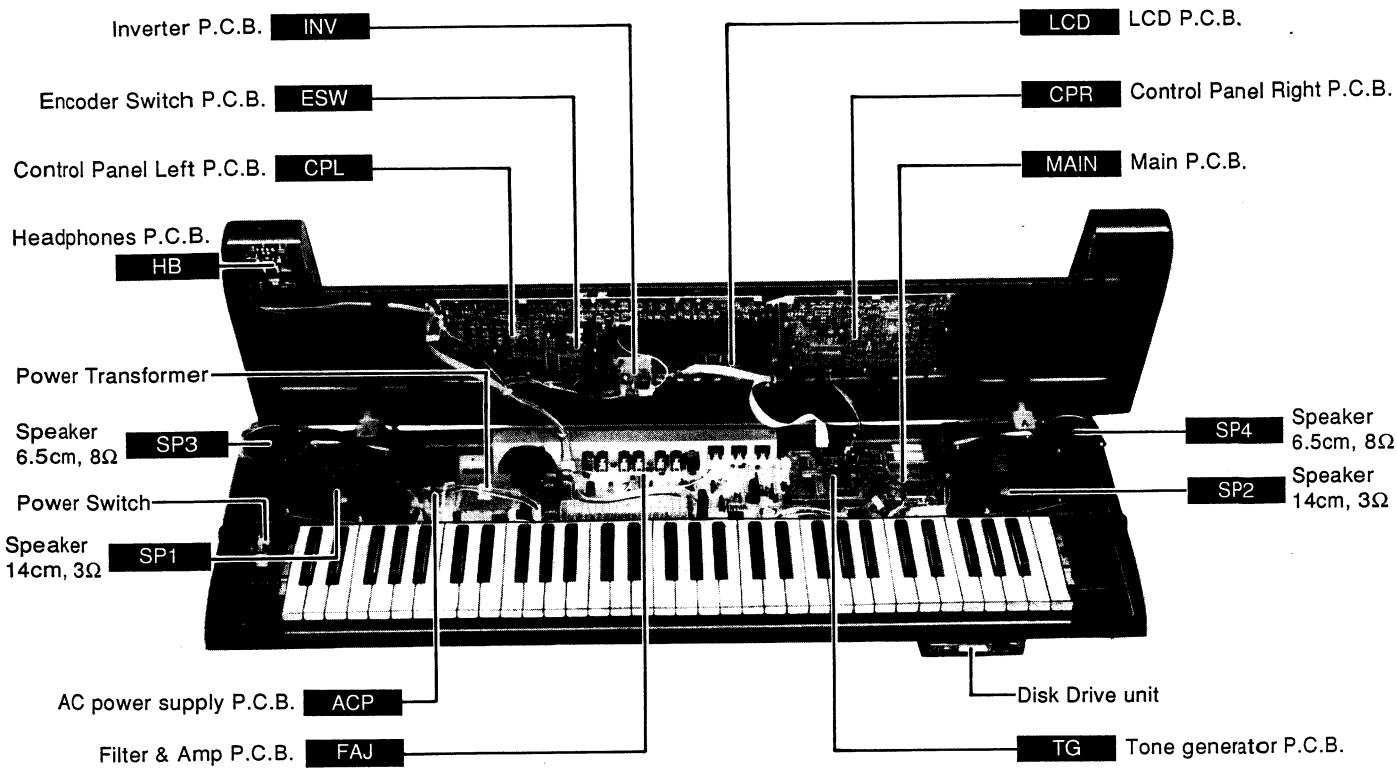
CONDUCTOR SETTINGS

The **CONDUCTOR** buttons are used to assign sounds to the keyboard in many different ways. For example, you can assign two sounds to the entire keyboard so that playing one key will produce two sounds. You can even split the keyboard into right and left sections (**SPLIT**), and assign a different sound to each section.

CONDUCTOR

CONDUCTOR settings	How sounds are assigned to the keyboard
	All keys produce the **RIGHT 1** sound. **RIGHT 1**
	All keys produce the **RIGHT 2** sound. **RIGHT 2**
	All keys produce both the **RIGHT 1** sound and the **RIGHT 2** sound. **RIGHT 1 + RIGHT 2**
	The left keys produce the **LEFT** sound and the right keys produce the **RIGHT 1** sound and the **RIGHT 2** sound. **LEFT** / **RIGHT 1 + RIGHT 2**
	The left keys produce the **LEFT** sound and the right keys produce the **RIGHT 1** sound. **LEFT** / **RIGHT 1**
	The left keys produce the **LEFT** sound and the right keys produce the **RIGHT 2** sound. **LEFT** / **RIGHT 2**

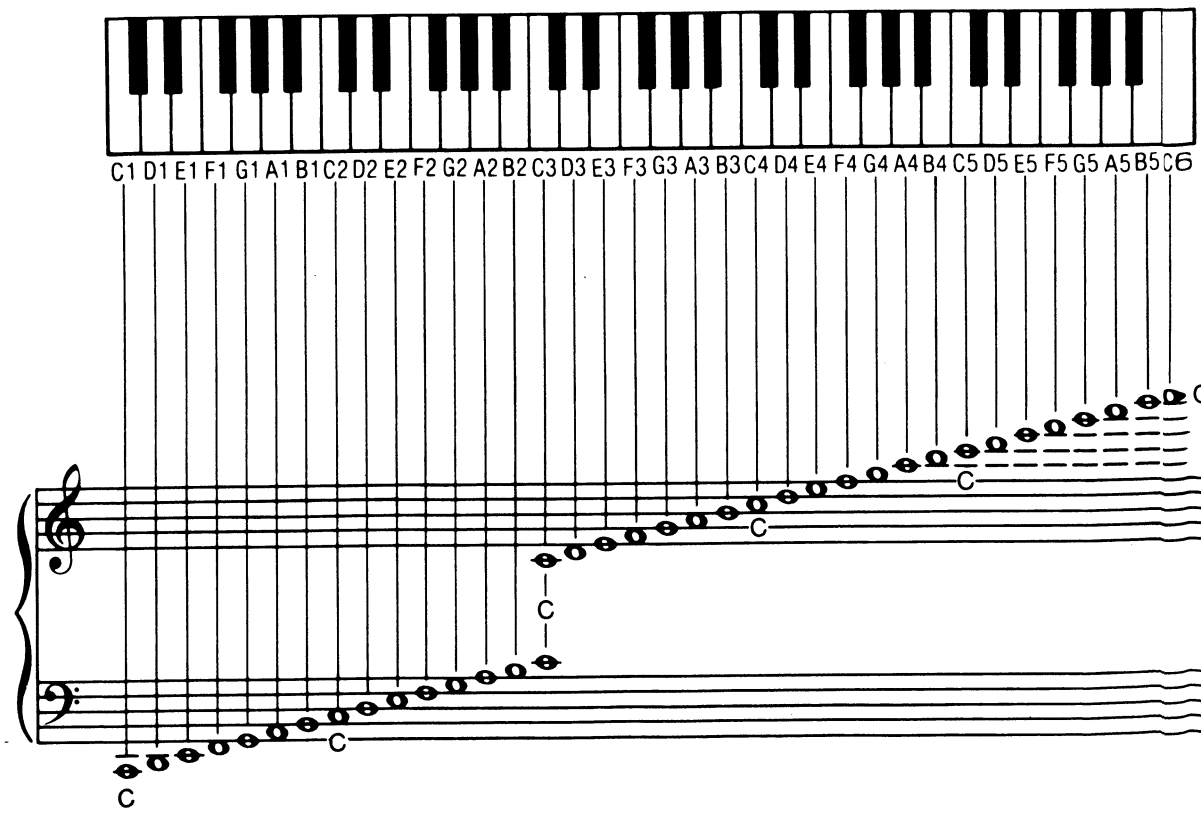
PARTS LOCATION



[Photo-1]

KEYBOARD RANGES

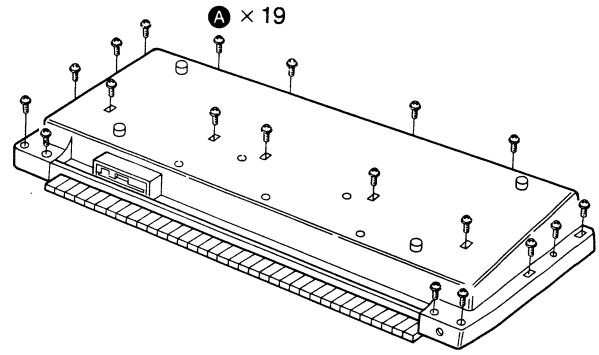
- This keyboard features Touch Response, by which you control the volume by playing the keys harder or softer.



DISASSEMBLY INSTRUCTIONS

[1] Opening the cabinet

1. Turn the keyboard cabinet upside down as shown in Fig. 1, and remove the bottom screws (Ⓐ 19 pcs.).
2. Place the keyboard bottomside down, and open the top cabinet.



[Fig. 1]

[2] Removing the printed circuit boards

- Open the cabinet (see step [1]). Use the brackets affixed to the right and left speaker boxes to attach the top cabinet as shown in Fig. 2.

MAIN TG P.C.B.

1. Remove the MAIN P.C.B. mounting screws (Ⓑ 4 pcs.).
2. Pull out the TG P.C.B. on the MAIN P.C.B..

FAJ P.C.B.

1. Remove the FAJ P.C.B. mounting screws (Ⓒ 5 pcs.).

ACP P.C.B.

1. Remove the AC inlet jack fixing screws on the rear panel (Ⓓ 1 pc.).
2. Remove the ACP P.C.B. mounting screws (Ⓔ 2 pcs.).

CPL P.C.B.

1. Pull off the **MAIN VOLUME** knob.
2. Remove the CPL P.C.B. mounting screws (Ⓕ 14 pcs.).

CPR P.C.B.

1. Remove the CPR P.C.B. mounting screws (Ⓖ 10 pcs.).

HB P.C.B.

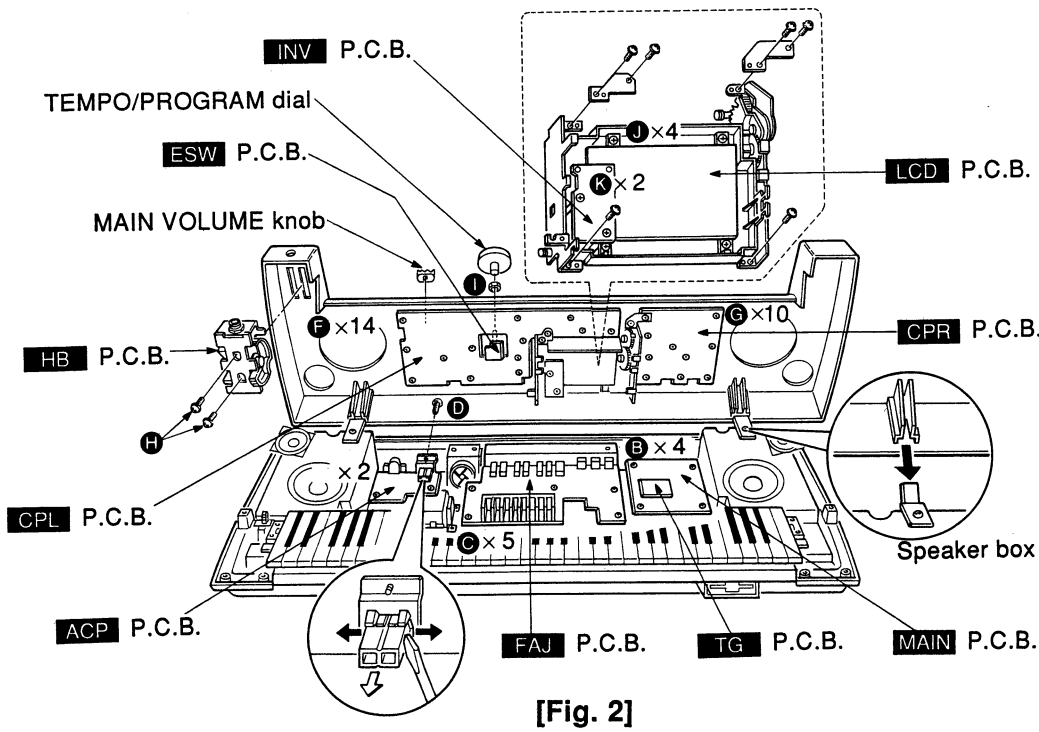
1. Remove the HB P.C.B. mounting screws (Ⓗ 2 pcs.).

ESW P.C.B.

1. Pull off the **TEMPO/PROGRAM** dial from the control panel.
2. Remove the encoder switch holding nut on the ESW P.C.B. (Ⓘ 1 pc.).
3. Open the cabinet, and remove the ESW P.C.B.

LCD INV P.C.B.

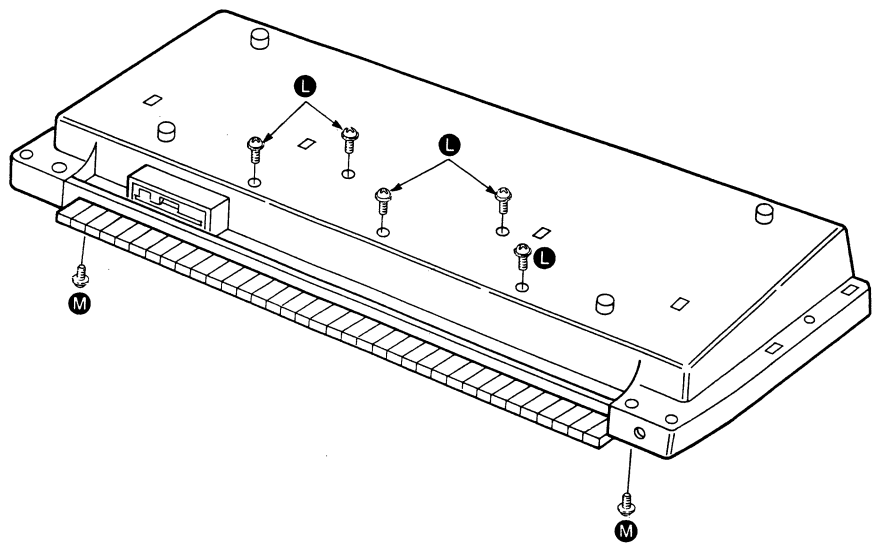
1. Remove the LCD P.C.B. mounting screws (Ⓙ 4 pcs.).
2. Remove the INV P.C.B. mounting screws (Ⓚ 2 pcs.).



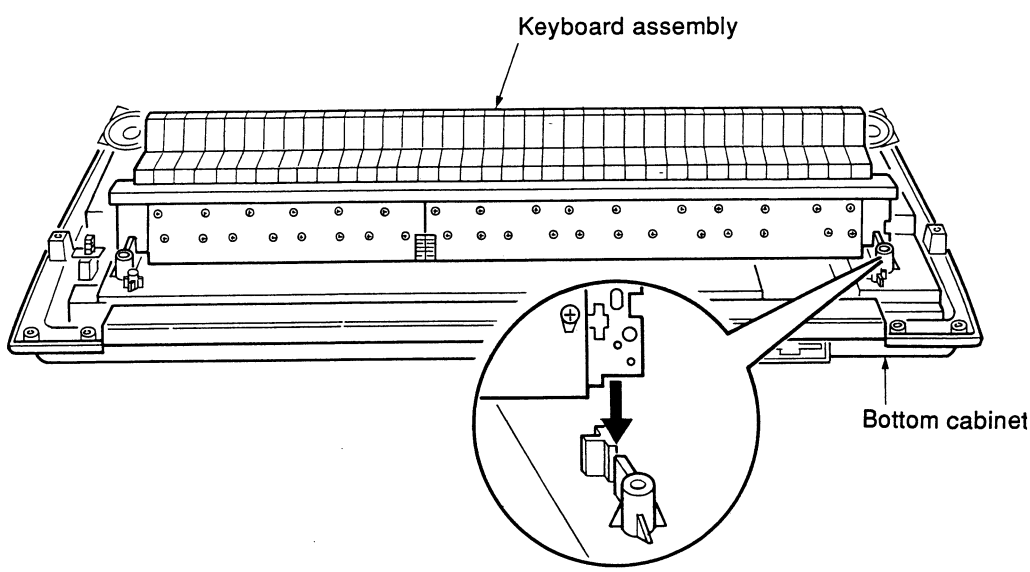
[Fig. 2]

3 Removing the keyboard

1. Remove the bottom screws (see step 1).
2. Remove the keyboard assembly holding screws (Ⓛ 5 pcs.).
3. Place the keyboard bottomside down, and open the top cabinet.
4. Remove the keyboard assembly holding screws (Ⓜ 2 pcs.). The keyboard assembly can be affixed to the holder on the bottom cabinet as shown in Fig. 4.



[Fig. 3]

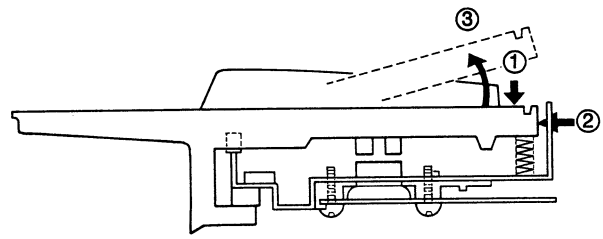


[Fig. 4]

4 Removing the keys

1. Remove the keyboard by following the procedure in step 3.
2. Press downward on the rear of the key (Fig. 5-①).
3. While pressing downward on the rear of the key, push the key forward and release it from the chassis (Fig. 5-②).
4. Lift the key and remove it from the chassis (Fig. 5-③.).

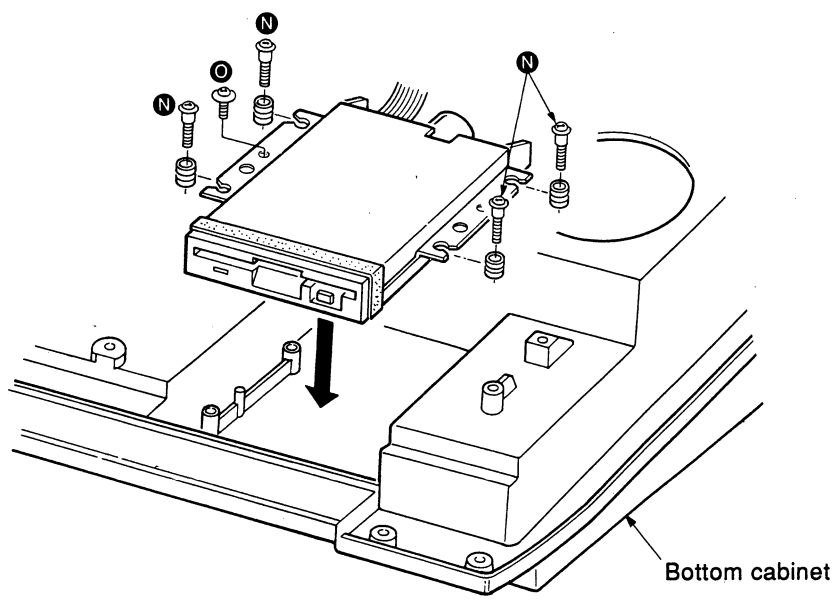
NOTE:
To remove a black key, the white key to either side of it should be removed first.



[Fig. 5]

5 Removing the digital disk recorder (DDR)

1. Removing the keyboard by following the procedure in step 3.
2. Remove the DDR mounting screws (Ⓝ 4 pcs. and Ⓞ 1 pc.).



[Fig. 6]

SYMPTOMS WHICH APPEAR TO BE SIGNS OF TROUBLE

The following changes in performance may occur in the Technics Keyboard but do not indicate trouble.

	Phenomenon	Remedy
Sounds and effects	The buttons, keys, etc. malfunction.	• Turn off the **POWER** button once, then turn it on again. If this procedure is not successful, turn off the **POWER** button once. Then, while pressing the three lower left buttons in the **RHYTHM GROUP** section (**8 BEAT 2, JAZZ ROCK & SOUL** and **DANCE POP**) at the same time, turn the **POWER** button on again. (Note that, in this case, all programmable settings, functions and memories return to their factory-preset status.)
	No sound is produced when the keys are pressed.	• The **MAIN VOLUME** is at the minimum setting. Adjust the volume with the **MAIN VOLUME** control. • The volumes for the selected parts are set to the minimum levels. Use the balance buttons to set the volumes of the relevant parts to appropriate levels. • The local control for a part performed on the keyboard is set to OFF. Set the local control to ON.
	Only percussive instrument sounds are produced when the keyboard is played.	• In the **SOUND GROUP** section, the **KEYBOARD PERC** button is on.
Rhythm	The rhythm does not start.	• The **DRUMS** volume is set to the minimum level. Use the balance buttons to set the **DRUMS** volume to an appropriate level. • In the **RHYTHM GROUP** section, a rhythm in **MEMORY A** or **MEMORY B** with no stored pattern was selected. Select a different rhythm. • A **SEQUENCER** track button is on. When you are not playing back the **SEQUENCER** performance, turn off the track buttons. • CLOCK is set to MIDI. Set CLOCK to INTERNAL.
SEQUENCER	Storage is not possible.	• The remaining memory capacity of the **SEQUENCER** is 0. Follow the SONG CLEAR or TRACK CLEAR procedure to erase the memory.
	Multi-track storage is not possible.	• The playback track has been selected, but the **START/STOP** button has not been pressed. A flashing track indicator shows the track which is ready for recording, and a lit track indicator shows a track which is ready for playback. To record one track while listening to another (playback) track, press the **START/STOP** button to begin playback.
	The playback measure indication is different from when the performance was recorded.	• The number of measures corresponds to the time signature of the rhythm selected at the start of recording. To change the rhythm in the middle of the song, record the rhythm change in the RHYTHM part.

	Phenomenon	Remedy
AUTO PLAY CHORD	No sound is produced for the automatic accompaniment.	• In the **RHYTHM GROUP** section, a rhythm in **MEMORY A** or **MEMORY B** with no stored pattern was selected. Select a different rhythm.
	No sound is produced for the automatic accompaniment, or only the sounds of some parts are produced.	• An **ACCOMP** part does not sound if its corresponding volume is set to the minimum level. Use the respective balance buttons to set the **ACCOMP 1**, **2** and **3** volumes to appropriate levels.
COMPOSER	Storage is not possible.	• The remaining memory capacity of the **COMPOSER** is 0.
	Setting the time signature and number of measures is not possible.	• The time signature and number of measures cannot be changed for a pattern which is currently recorded in the **COMPOSER**. If you wish to change the time signature and/or measure data, first follow the procedure to clear the memory.
	The playback timing of the rhythm pattern is different from the timing with which it was recorded.	• The QUANTIZE function was on when the pattern was recorded and the timing was automatically corrected. Set the quantize level to a smaller note unit or to OFF when recording.
Disk Drive	The Disk Drive produces a noise during recording or playback.	• This occurs when the Disk Drive is reading a disk. It does not indicate a problem.
	When the procedure to load from a disk is performed, the contents of the keyboard memory are erased.	• When performing the load operation from a disk, the keyboard memory changes to that of the data loaded from the disk. If you wish to preserve a song which is stored in the keyboard memory, save it on a disk before performing the load procedure.
Other	Noise from a radio or TV can be heard.	• This sometimes occurs when electrical equipment such as a radio or TV is used near the instrument. Try moving such electrical equipment further away from the instrument. • The sound may be coming from a nearby broadcast station or amateur radio station. If the sound is bothersome, consult your dealer or service center.
	The cabinet becomes warm during use.	• This instrument has a built-in power source that heats the cabinet to some degree. This is not an indication of trouble.

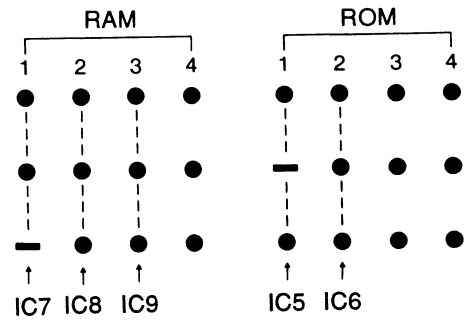
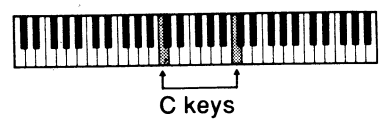
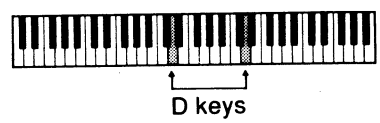
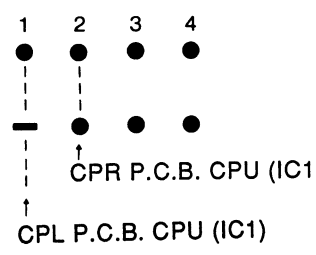
ERROR DISPLAY

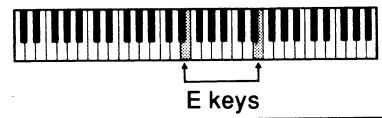
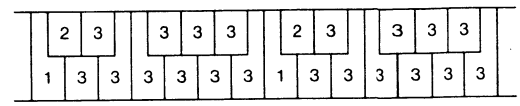
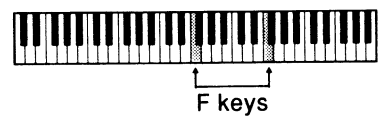
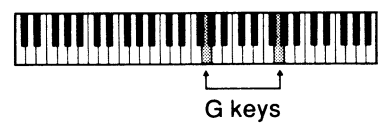
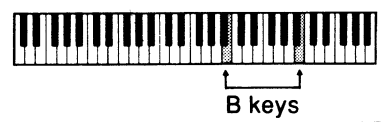
No.	Contents
00	The data on the disk that you are using is for a different product.
01	An error has occurred while the disk was loading. Please try again!
02	There is no disk in the Disk Drive.
03	The file that you tried to load is empty.
05	An error has occurred while the disk was saving. Please try again!
06	The disk that you are using is write protected. Please remove the write protection and try again.
07	The disk that you are using is full. Please use another disk.
08	An error has occurred while the disk was formatting. The disk that you are using may be faulty. Please try formatting another disk.
10	The data is already copy protected.
11	The password that you entered is incorrect.
20	A problem has occurred with your **SEQUENCER** Data. This might be due to a damaged or faulty disk.
21	Memory full
22	It is necessary to press PUNCH OUT to complete this procedure.
23	It is impossible to change the time signature because it has already been set in the existing tracks.
24	A rhythm track already exists. It is impossible to assign two tracks to rhythm.
25	It is only possible to change the velocity on a melody track.
26	It is only possible to merge melody tracks. Tracks such as rhythm, chord and control cannot be merged.

No.	Contents
27	It is only possible to copy melody tracks. Tracks such as rhythm, chord and control cannot be copied.
28	This song is too long to be saved as a MIDI file.
29	The MIDI file that you have tried to load exceeds the memory capacity of the KN2000 and cannot be played. The **SEQUENCER** memory has been cleared.
30	It is not possible to change the time signature or measure length of a **COMPOSER** pattern after it has been recorded. If you want to proceed, you must first clear the entire **COMPOSER** pattern.
31	The time signature of the pattern from which you are copying is different from the **COMPOSER** memory that you are using. Either: Change the time signature of the **COMPOSER** memory or: Copy from a pattern that has the same time signature
32	Memory full
40	The Identification (ID) code of the system exclusive data received by the KN2000 is for a different product.
41	An error has occurred during system exclusive data reception. The data from the transmitting device may be incomplete. Please try again.
42	An error has occurred during system exclusive transmission. The data has not been received correctly. Please try again.
43	The file that you are trying to load was saved on a previous KN keyboard. It is only possible to load using the "ALL" option.
44	It is impossible to edit a Drum Kit. Please select a different sound from any group except Keyboard Percussion.

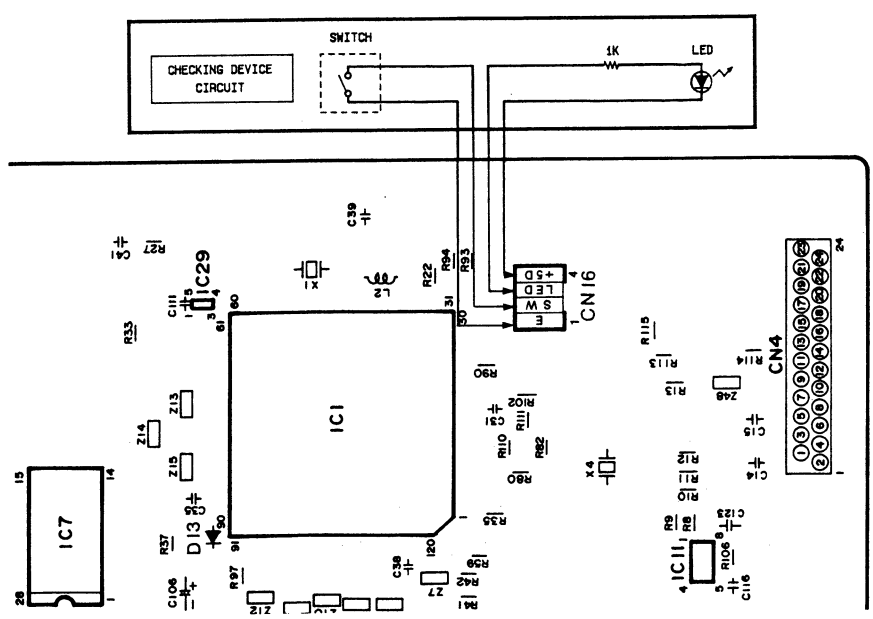
ABOUT THE SELF-DIAGNOSTIC FUNCTION

This model has some self-diagnostic capabilities. When set to the self-diagnostic mode, operation of various components can be verified by following the procedures in the chart below.

<table>
<tr><th>No.</th><th>PCB</th><th>TEST MODE</th><th>Procedure</th></tr>
<tr><td>1</td><td>MAIN</td><td>RAM (IC7, 8, 9), ROM (IC5, 6) check</td><td>1. Connect the CHECKING DEVICE (refer to page I-14) to CN16 on the MAIN P.C.B., and turn on the CHECKING DEVICE switch.
2. Turn on the power switch.</td></tr>
<tr><td colspan="4">When the power switch is turned on, the LED of the CHECKING DEVICE flashes 8 times. The first 4 flashes are for the RAM check, and the latter 4 flashes are for the ROM check. The order of the LED flashes corresponds to the respective IC numbers as shown below. If an IC is defective, the corresponding flash time is longer.
Examples
1. RAM OK, ROM OK
2. RAM OK, ROM (IC5) defective
3. RAM (IC7) defective, ROM OK
Note: ● indicates short flash time= OK
▬ indicates long flash time = Defective
 
</td></tr>
<tr><td>2</td><td>MAIN</td><td>V53 gate array (IC2) check</td><td>While pressing two C keys simultaneously, turn on the power switch.
 
</td></tr>
<tr><td colspan="4">Monitor pins 89~96 (P00~P07) of IC2 on an oscilloscope, and check whether incromental data (see figure) is output.
</td></tr>
<tr><td>3</td><td>CP</td><td>Control panel CPU check.</td><td>1. Connect the CHECKING DEVICE to CN16 on the MAIN P.C.B. (The Checking Device switch should be off.)
2. While pressing two D keys simultaneously, turn on the power switch.
 
</td></tr>
<tr><td colspan="4">When the power switch is turned on, the LED of the CHECKING DEVICE flashes 4 times. The order of the LED flashes corresponds to the CPU (IC) on the respective P.C.B.s as shown below. If an IC is defective, the corresponding flash time is longer.
1. OK
2. CPL CPU defective
Note: ● indicates short flash time= OK
▬ indicates long flash time = Defective
 
</td></tr>
</table>

No.	PCB	TEST MODE	Procedure
4	MAIN	Wave ROM (IC15, 19, 20) check	While pressing two E keys simultaneously, turn on the power switch.  E keys
		When set to the self-diagnostic mode, the Wave ROM outputs a sine wave. The Wave ROMs correspond to the keyboard keys as shown in the diagram to the right. When a key is pressed, the corresponding sine wave sound is produced. If no sound is produced, or if the sound is distorted, the Wave ROM corresponding to that key is defective.	• The key number indicates the Wave ROM number (1: IC15, 2: IC19, 3: IC20). 
5	CPL, CPR	LED & SW check	While pressing two F keys simultaneously, turn on the power switch.  F keys
		All the LEDs turn off after lighting once. Confirm that all the LEDs light.	
6	LCD	LCD Display check	While pressing two G keys simultaneously, turn on the power switch.  G keys
		The test pattern for the LCD character display is shown. There are more than 10 different test patterns, which are selected with the TRANSPOSE buttons. Only the first display of the test pattern display differs. Confirm that the characters appear correctly.	
7	MKB	Keyboard ROM (IC2) check	While pressing two B keys simultaneously, turn on the power switch.  B keys
		If the keyboard ROM (IC2) is OK, one confirming beep will sound. If it is defective, several consecutive error beeps will sound.	

■ Connection between serving CHECKING DEVICE and MAIN PCB



MIDI IMPLEMENTATION CHART

Keyboard [SX−KN2000] (Transmitted)

Function		RIGHT1,2,LEFT, PART4～15	PART16	ACMP1	ACMP2,3	BASS	DRUMS	CHORD	CONTROL	Remarks
Basic Channel	Default	1-16	1-16	1-16	1-16	1-16	1-16	1-16	1-16	memorized
	Changed	1-16	1-16	1-16	1-16	1-16	1-16	1-16	1-16	
Mode	Default	3	3	3	3	3	3	3	3	OMNI OFF,POLY MODE
	Messages	×	×	×	×	×	×	×	×	
	Altered	−	−	−	−	−	−	−	−	
Note Number		0-127	0-127	0-127	0-127	0-127	0-127	0-127	−	Changes depending on the position of the transpose control,octave shift,and drums type.
	True voice	−	−	−	−	−	−	−	−	
Velocity	Note ON	○	○	○	○	○	○	○	−	
	Note OFF	×	×	×	×	×	×	×	−	
After Touch	Key's	×	×	×	×	×	×	×	−	
	Ch's	×	×	×	×	×	×	×	−	
Pitch Bender		○×*	×	○×*	○×*	○×*	×	○×*	×	
Control Change	0,32	○×*	○×*	○×*	○×*	○×*	○×*	○×*	○×*	bank select MSB, LSB
	1	○×*	×	○×*	○×*	○×*	×	○×*	×	modulation
	6,38	○×*	×	×	×	×	×	×	×	data entry MSB, LSB
	7	○×*	○×*	○×*	○×*	○×*	○×*	○×*	×	volume
	10	○×*	×	×	×	×	×	×	×	panpot
	11	○×*	○×*	×	×	×	×	×	○×*	expression
	64	○×*	○×*	○×*	○×*	○×*	○×*	×	×	sustain
	80	×	×	○×*	×	×	×	×	×	auto play chord
	82	×	×	×	×	×	○×*	×	×	intro, fill in, ending
	91	○×*	○×*	○×*	○×*	○×*	○×*	○×*	○×*	reverb
	93	○×*	×	○×*	○×*	○×*	×	○×*	×	digital effect
	94	○×*	○×*	×	×	×	×	×	×	DSP effect
	100,101	○×*	×	×	×	×	×	×	×	RPN LSB, MSB
	121	○	○	×	×	×	×	×	×	all sound off
		○×*	○×*	×	○×*	○×*	○×*	○×*	×	reset all cotrollers
Prog Change		○×*	○×*	○×*	○×*	○×*	○×*	○×*	○×*	Changes depending on program change mode and prog.cng to p.mem.
	True #	−	−	−	−	−	−	−	−	
System exclusive		○								
System common	Song Pos	○×*								
	Song Sel	○×* (0-19)								
	Tune	×								
System Real Time	Clock	○								
	Commands	○×*								start/stop,continue
Aux Messages	Local ON/ OFF	×	×	×	×	×	×	×	−	
	All notes OFF	×	×	×	×	×	×	×	−	
	Active Sense	○								
	Repeat	×								
Notes		○×*……Whether or not the data for each of these items is transmitted can be set.								

Mode 1: OMNI ON, POLY Mode 2: OMNI ON, MONO ○:Yes

Mode 3: OMNI OFF, POLY Mode 4: OMNI OFF, MONO ×:No

Keyboard [SX−KN2000] (Recognized)

Function		RIGHT1,2,LEFT, PART4～15	PART16	ACMP1	ACMP2,3	BASS	DRUMS	CHORD	CONTROL	Remarks
Basic Channel	Default	1-16	1-16	1-16	1-16	1-16	1-16	1-16	1-16	memorized
	Changed	1-16	1-16	1-16	1-16	1-16	1-16	1-16	1-16	
Mode	Default	3	3	3	3	3	3	3	3	OMNI OFF,POLY MODE
	Messages	×	×	×	×	×	×	×	×	
	Altered	–	–	–	–	–	–	–	–	
Note Number		0-127	0-127	0-127	0-127	0-127	0-127	0-127	–	Changes depending on the position of the transpose control,octave shift, and drums type.
	True voice	0-127	0-127	0-127	0-127	0-127	0-127	0-127	–	
Velocity	Note ON	○	○	○	○	○	○	○	–	
	Note OFF	×	×	×	×	×	×	×	–	
After Touch	Key's	×	×	×	×	×	×	×	–	
	Ch's	×	×	×	×	×	×	×	–	
Pitch Bender		○×*	×	○×*	○×*	○×*	×	○×*	×	
Control Change	0,32	○×*	○×*	○×*	○×*	○×*	○×*	○×*	○×*	bank select MSB, LSB
	1	○×*	×	○×*	○×*	○×*	×	○×*	×	modulation
	6,38	○×*	×	×	×	×	×	×	×	data entry MSB, LSB
	7	○×*	○×*	○×*	○×*	○×*	○×*	○×*	×	volume
	10	○×*	×	×	×	×	×	×	×	panpot
	11	○×*	○×*	×	×	×	×	×	○×*	expression
	64	○×*	○×*	○×*	○×*	○×*	○×*	×	×	sustain
	80	×	×	○×*	×	×	×	×	×	auto play chord
	82	×	×	×	×	×	○×*	×	×	intro, fill in, ending
	91	○×*	○×*	○×*	○×*	○×*	○×*	○×*	○×*	reverb
	93	○×*	×	○×*	○×*	○×*	×	○×*	×	digital effect
	94	○×*	○×*	×	×	×	×	×	×	DSP effect
	100,101	○×*	×	×	×	×	×	×	×	RPN LSB, MSB
	121	○	○	○	○	○	○	○	×	all sound off
		○×*	○×*	×	○×*	○×*	○×*	○×*	×	reset all cotrollers
Prog Change		○×*	○×*	○×*	○×*	○×*	○×*	○×*	○×*	Changes depending on program change mode and prog.cng to p.mem.
	True #	0-127	0-127	0-127	0-127	0-127	0-127	0-127	0-21	
System exclusive		○								
System common	Song Pos	○×*								
	Song Sel	○×* (0-19)								
	Tune	×								
System Real Time	Clock	○								
	Commands	○×*								start/stop,continue
Aux Messages	Local ON/ OFF	×	×	×	×	×	×	×	–	
	All notes OFF	○	○	○	○	○	○	○	–	
	Active Sense	○								
	Repeat	×								
Notes		○×*……Whether or not the data for each of these items is received can be set.								

Mode 1: OMNI ON, POLY Mode 2: OMNI ON, MONO ○:Yes

Mode 3: OMNI OFF, POLY Mode 4: OMNI OFF, MONO ×:No

PRECAUTIONS BEFORE SERVICING

■ Precautions for measuring of the output waveforms.

1. The waveform was measured with a "National Digital Storage Oscilloscope VP-5730A". Therefore the waveforms of musical tone signals shown may differ somewhat due to the difference in the timing of triggering.
2. Since the 1/10 test probe is used, the indicated voltage value on the bottom part of each waveform photo is 1/10 of the actual value (e.g. 0.2V/cm should be 2.0V/cm).

■ Important safety notice:

Components identified by a ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

■ Symbolic Marks

The symbolic marks for resistors and capacitors which used in this circuits are classified as following TABLE-1 and TABLE-2.

1. RESISTORS
   - Resistors without symbolic mark are FIXED CARBON FILM RESISTORS (ERD-type).
   - All resistors are 1/4WATT, ±5% TOLERANCE unless otherwise designated in the schematic diagrams.

(TABLE-1)

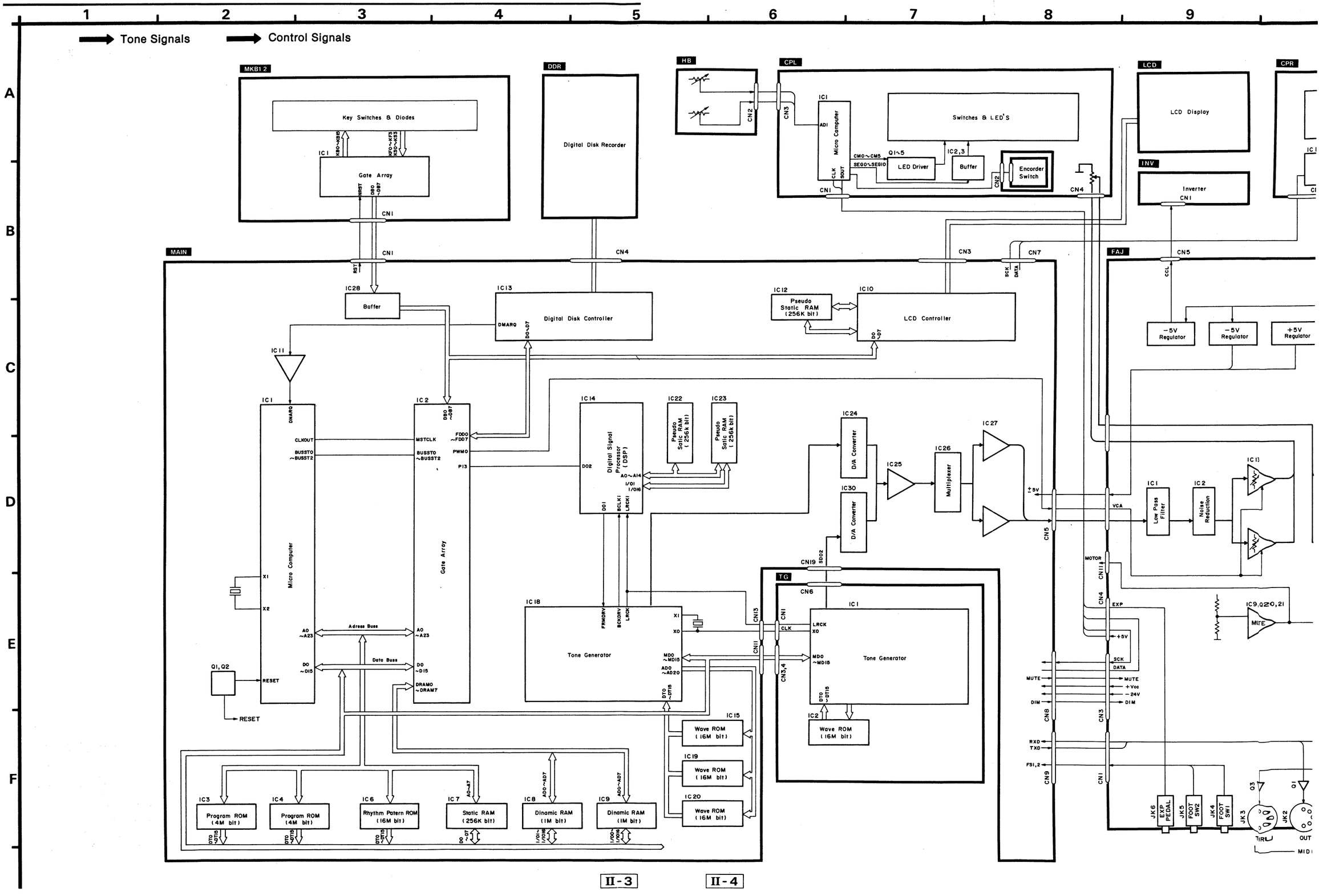
SYMBOL	SPECIFICATION	SYMBOL	SPECIFICATION
Ⓕ	Fixed Carbon Film Resistors "FLAME-PROOF" (ERD—F—type)	Ⓕ	Fixed Metal Film Resistors "FLAME-PROOF" (ERX—type)
Ⓕ	Fixed Wire Wound Resistors "FLAME-PROOF" (ERF—type)	[F]	Fuse Type Fixed Metal Oxide Film Resistors "FLAME-PROOF" (ERQ—type)
Ⓕ	Fixed Metal Oxide Film Resistors "FLAME-PROOF" (ERG—type)	[F]	Fuse Type fixed Carbon Film Resistors "FLAME-PROOF" (ERD2FC—type)
Ⓖ	Fixed Metal Film Resistors (Precision and High Stability) (ERO—type)		

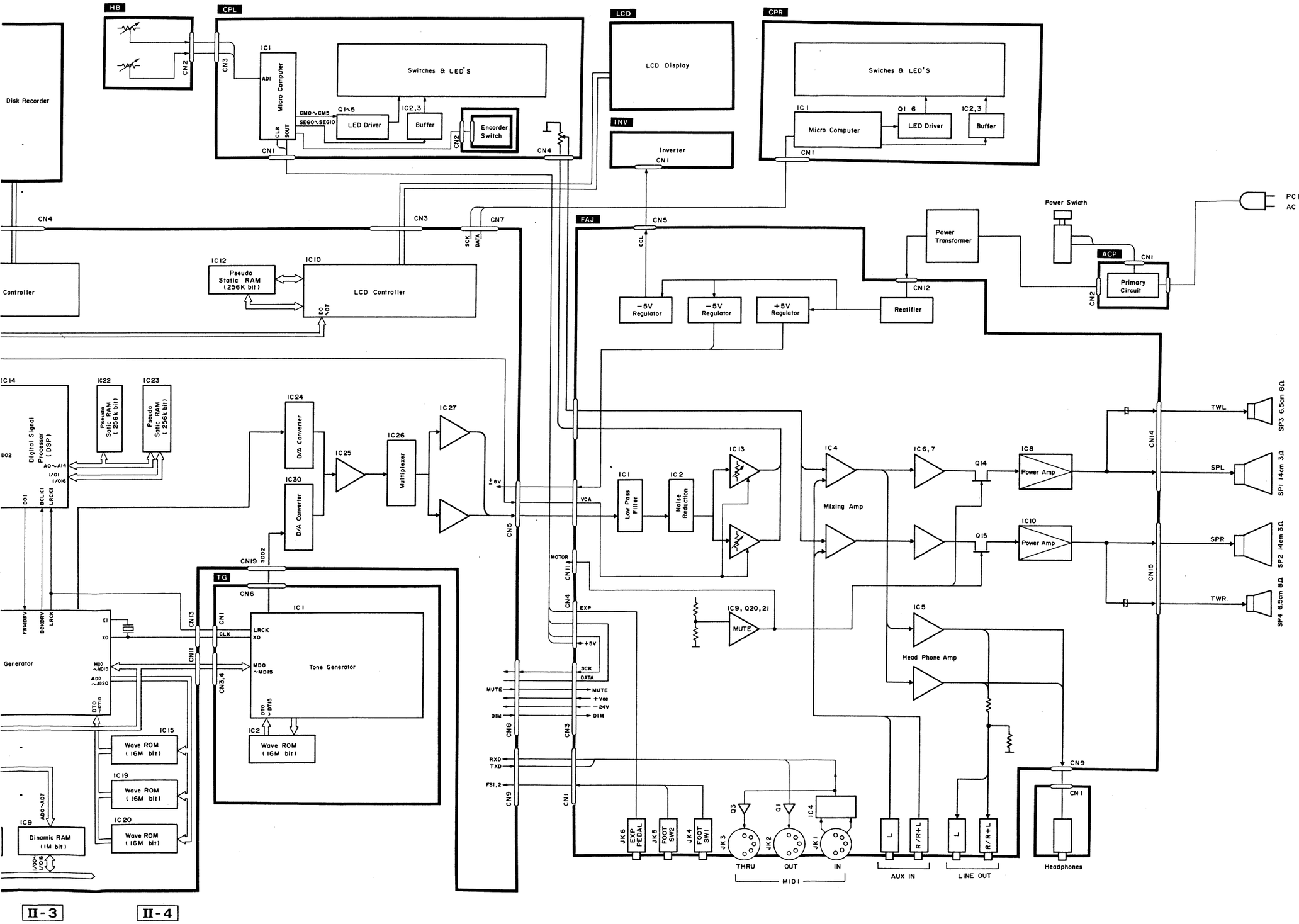
2. CAPACITORS
   - Capacitors without symbolic mark are POLYESTER CAPACITORS. (ECQM-type, ECQG-type, ±10% Tolerance)
   - Polarized capacitors without symbolic mark are Aluminum Electrolytic Capacitors. (ECEA—type, ±20% Tolerance)

(TABLE-2)

SYMBOL	SPECIFICATION	TYPE
Ⓝ	Non-Polarized Electrolytic Capacitors	ECEA_KN_type
Ⓨ	Non-Polarized Electrolytic (for Network System)	ECEA_Y_type
Ⓣ	Tantalum Solid Electrolytic Capacitors	ECS_type
ⓉⒻ	Metalized Plastic Film Capacitors (TF Series)	ECQV_type
○	Temperature Compensating Ceramic Capacitors	ECC_type
	High-Dielectric Constant Ceramic Capacitors	ECK_type ECR_type
	Axial Lead Ceramic Capacitors	ECB_type
	Metalized Polyester Film Capacitors for Across the Line	ECQ_EW_type
	Aluminum Electrolytic Capacitors for Smoothing Circuit	ECES_type
	Multilayer Ceramic Chip Capacitors	ECUV_type

BLOCK DIAGRAM




HB
CN2
CPL
CN3
IC1
ADI
Micro Computer
CLK
SOUT
CM0~CM5
SEG0~SEG10
Q1~5
LED Driver
IC2,3
Buffer
Switches & LED'S
Encorder Switch
CN2
CN1
CN4
LCD
LCD Display
INV
Inverter
CN1
CPR
Swiches & LED'S
IC1
Micro Computer
Q1 6
LED Driver
IC2,3
Buffer
CN1
Disk Recorder
CN4
CN3
CN7
SCK
DATA
Controller
IC12
Pseudo Static RAM (256K bit)
IC10
LCD Controller
DO0~DO7
FAJ
CN5
CCL
-5V Regulator
-5V Regulator
+5V Regulator
Rectifier
Power Transformer
CN12
Power Swicth
ACP
CN1
Primary Circuit
CN2
PC1
AC IN
IC14
Digital Signal Processor (DSP)
DO2
DO1
BCLKI
LRCKI
A0~A14
I/O1
I/O16
IC22
Pseudo Static RAM (256k bit)
IC23
Pseudo Static RAM (256k bit)
IC24
D/A Converter
IC30
D/A Converter
IC25
IC26
Multiplexer
IC27
±5V
VCA
CN5
IC1
Low Pass Filter
IC2
Noise Reduction
IC13
IC4
Mixing Amp
IC6,7
Q14
Q15
IC8
Power Amp
IC10
Power Amp
CN14
CN15
TWL
SP3 6.5cm 8Ω
SPL
SP1 14cm 3Ω
SPR
SP2 14cm 3Ω
TWR
SP4 6.5cm 8Ω
CN15
SDO2
TG
CN6
IC1
CN13
CN1
CN11
CN3,4
LRCK
CLK
XI
XO
MDO ~MD15
DTO ~DT15
Tone Generator
IC2
Wave ROM (16M bit)
IC15
Wave ROM (16M bit)
IC19
Wave ROM (16M bit)
IC20
Wave ROM (16M bit)
IC9
Dinamic RAM (1M bit)
FRMDRY
BCKDRY
LRCK
Generator
MD0 ~MD15
AD0 ~A020
DT0 ~DT15
AD0~AD7
I/O0~I/O16
CN11
MOTOR
CN4
EXP
+5V
SCK
DATA
MUTE
+Vcc
-24V
DIM
CN8
CN3
MUTE
DIM
RXD
TXD
FSI1,2
CN9
CN1
IC9, Q20, 21
MUTE
IC5
Head Phone Amp
CN9
CN1
Headphones
JK6 EXP PEDAL
JK5 FOOT SW2
JK4 FOOT SW1
JK3
JK2
JK1
Q3
Q1
IC4
THRU
OUT
IN
MIDI
L
R/R+L
AUX IN
L
R/R+L
LINE OUT

MAIN, TG CIRCUIT BOARD

1 2 3 4 5 6 7 8 9 10

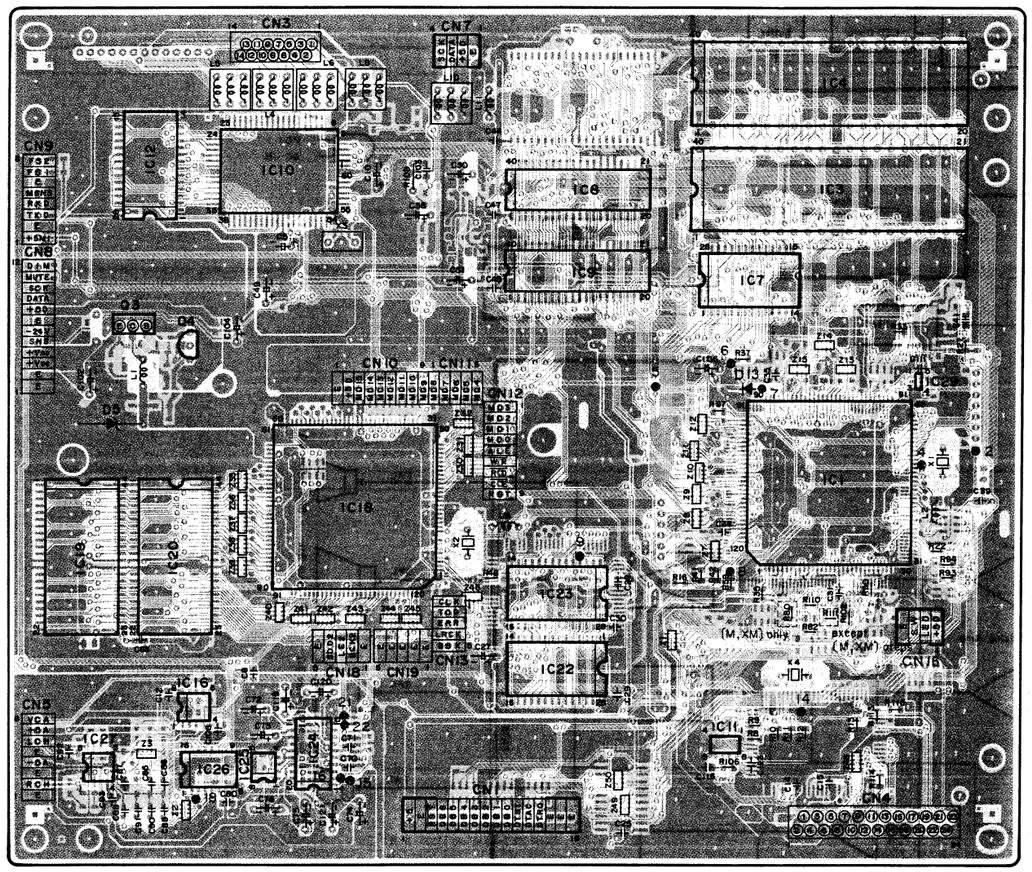
A B C D E F

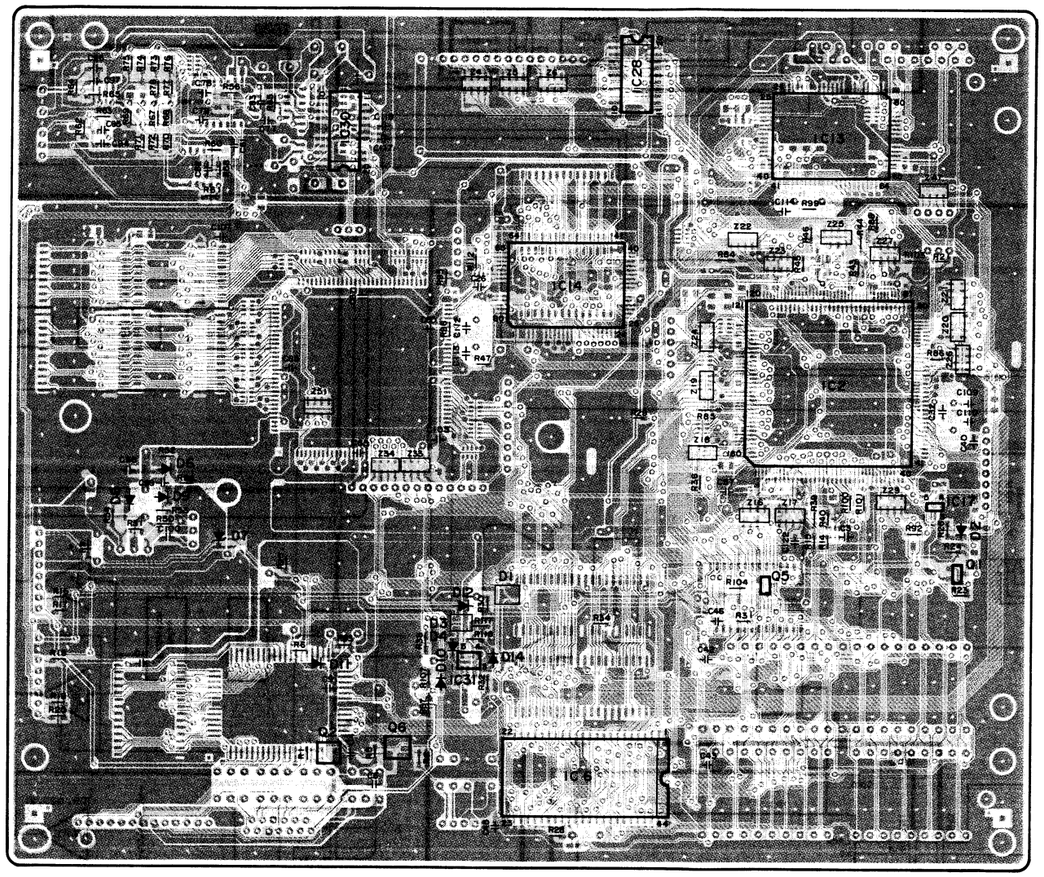
MAIN COMPONENT SIDE

Component Side
Foil Side

MAIN FOIL SIDE

• [M] [XM] areas	SXPG215131
• [MC] area	SXPG215141
• [EZ] [EW] [EA] areas	SXPG215151
• Others	SXPG215111





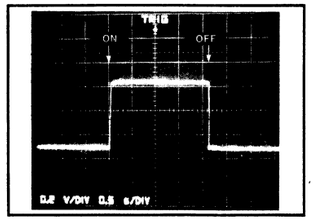
MAIN

NOTES:

- IC'S

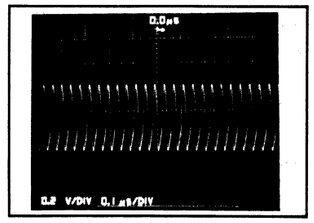
IC1:	D70236C
IC2:	D65046C
IC3:	QSIGCK
IC4:	QSIGCK
IC4:	QSIGCK
IC6:	QSIG03C
IC7:	ATT7C25
IC8, 9:	M5M411
IC10:	SED133C
IC11:	TC7W14
IC12:	HM6525
IC13:	D72068C
IC14:	D6382GI
IC16:	M5218A
IC17:	TC7S86I
IC18:	TC2554C
IC19:	QSIGM3
IC20:	QSIGM3
IC22, 23:	HM6525
IC24:	PCM170
IC25:	M5238FI

❷ RESET

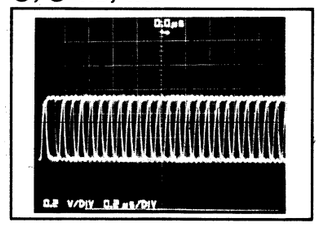


Power ..... ON → OFF

❹



❺, ❻ $\overline{RD}$, $\overline{WR}$



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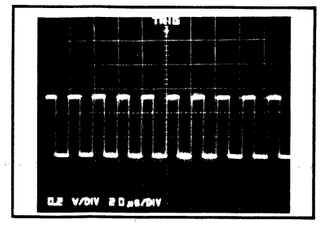

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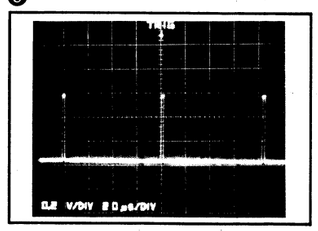
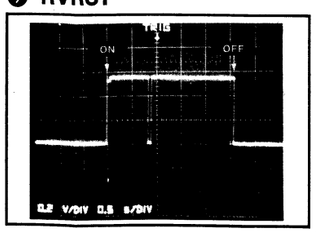
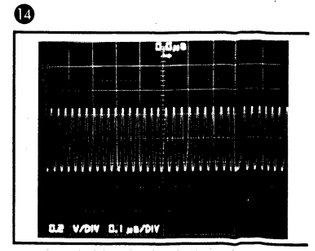


❾ RVRST



Power ..... ON → OFF

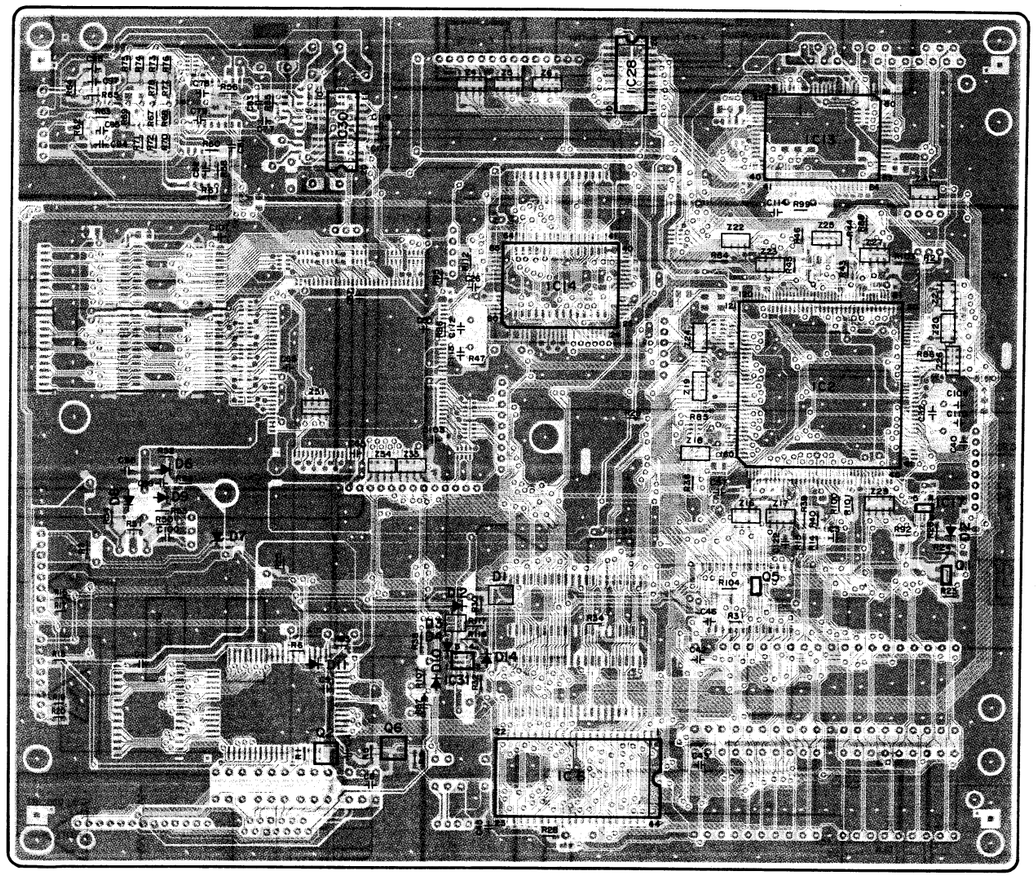
❿



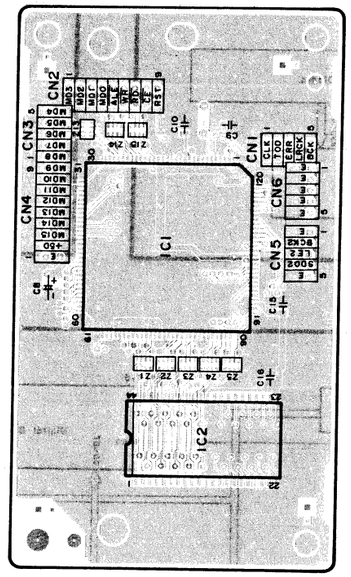
ide

MAIN FOIL SIDE

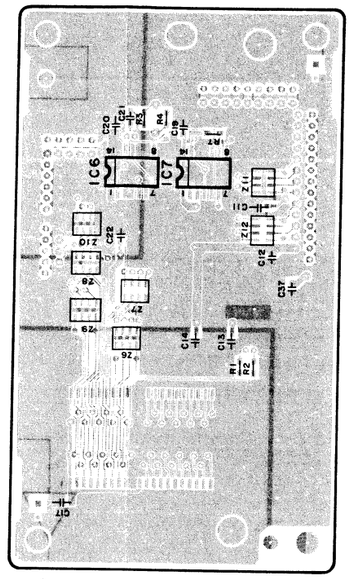
- [M] [XM] areas — SXPG215131
- [MC] area — SXPG215141
- [EZ] [EW] [EA] areas — SXPG215151
- Others — SXPG215111



TG COMPONENT SIDE



TG FOIL SIDE — SXPG216311



MAIN

NOTES:

- IC'S

IC1:	D70236GD125B
IC2:	D65046GD188
IC3:	QSIGCKN20AX
IC4:	QSIGCKN20BX, others
IC4:	QSIGCKN20C, EZ EW EA only
IC6:	QSIG03C16015
IC7:	ATT7C256BF85
IC8, 9:	M5M411664J8S
IC10:	SED1330FBA
IC11:	TC7W14F
IC12:	HM65256BLF10
IC13:	D72068GF-3B9
IC14:	D6382GF-3B9
IC16:	M5218AFP
IC17:	TC7S86F
IC18:	TC25540AF006
IC19:	QSIGM3C16194
IC20:	QSIGM3C16193
IC22, 23:	HM65256BLF10
IC24:	PCM1702U
IC25:	M5238FP
IC26:	T74H4051AF
IC27:	M5218AFP
IC28:	M74HC244FP
IC29:	TC7S32F
IC30:	PCM1702U
IC31:	TC7S66F

- TRANSISTORS

Q1, 6:	2SB709ARTW
Q2, 5:	2SD601AQTW
Q3:	2SA1643
Q4:	2SC1815GR

- DIODES

D1:	MA704WK
D2, 4, 6, 11~14:	MA110
D3:	MA151WK
D5:	MA2062LF
D7:	MA8056
D8:	MA738
D9:	MA8051
D10:	MA8180

TG

NOTES:

- IC'S

IC1:	TC25540AF006
IC2:	QSIGH3C16D81
IC6:	M74HC00FP
IC7:	M74HC74FP

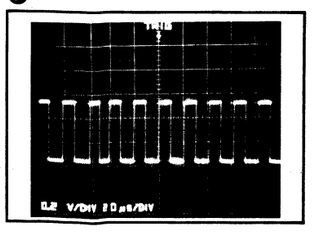
■ Measuring Conditions

Check Point ⓯~㉒

Set to the self-diagnostic mode followings.

- While pressing E3 key and E4 key simultaneously, turn on the power switch.

❼



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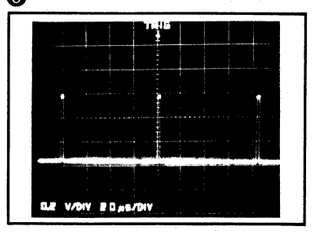
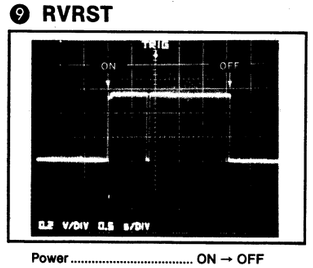
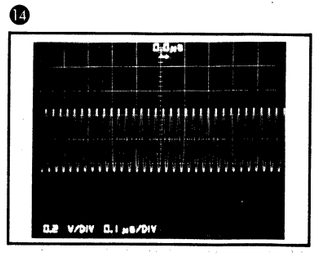


❾ RVRST

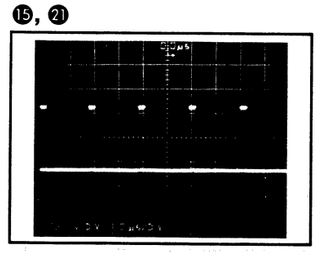


Power ..... ON → OFF

⓮



⓯, ㉑



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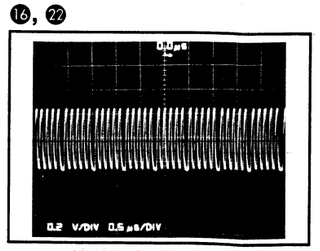

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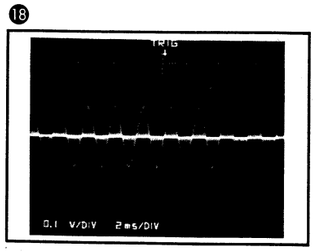
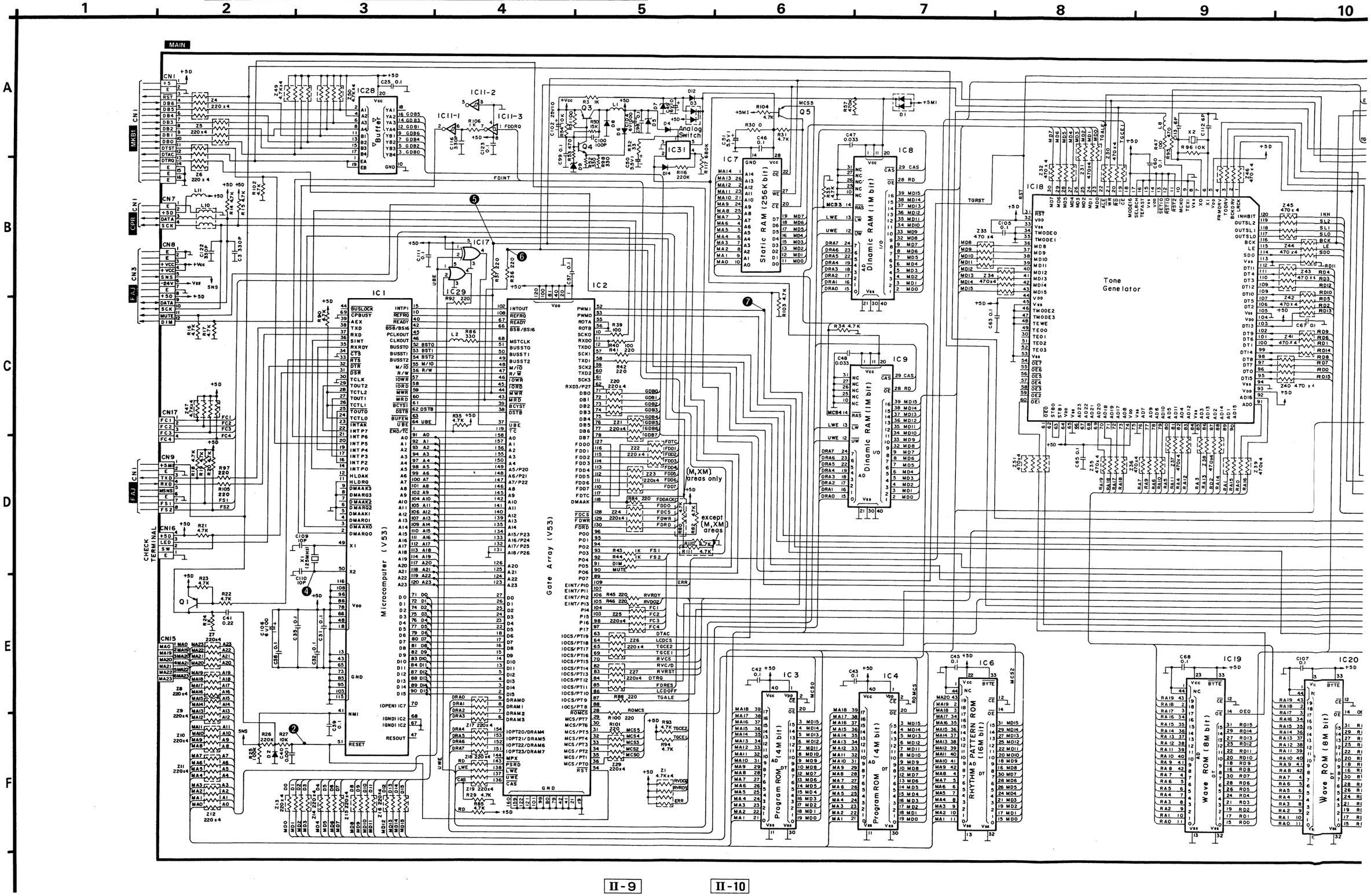


MAIN TG MAIN AND TG CIRCUIT DIAGRAM



TG

Tone Genalator

Wave ROM (8M bit)

Digital Signal Processor (DSP)

256K PSRAM

Pseudo Static RAM (256K bit)

LCD CONTROLLER

Digital Disk Controller

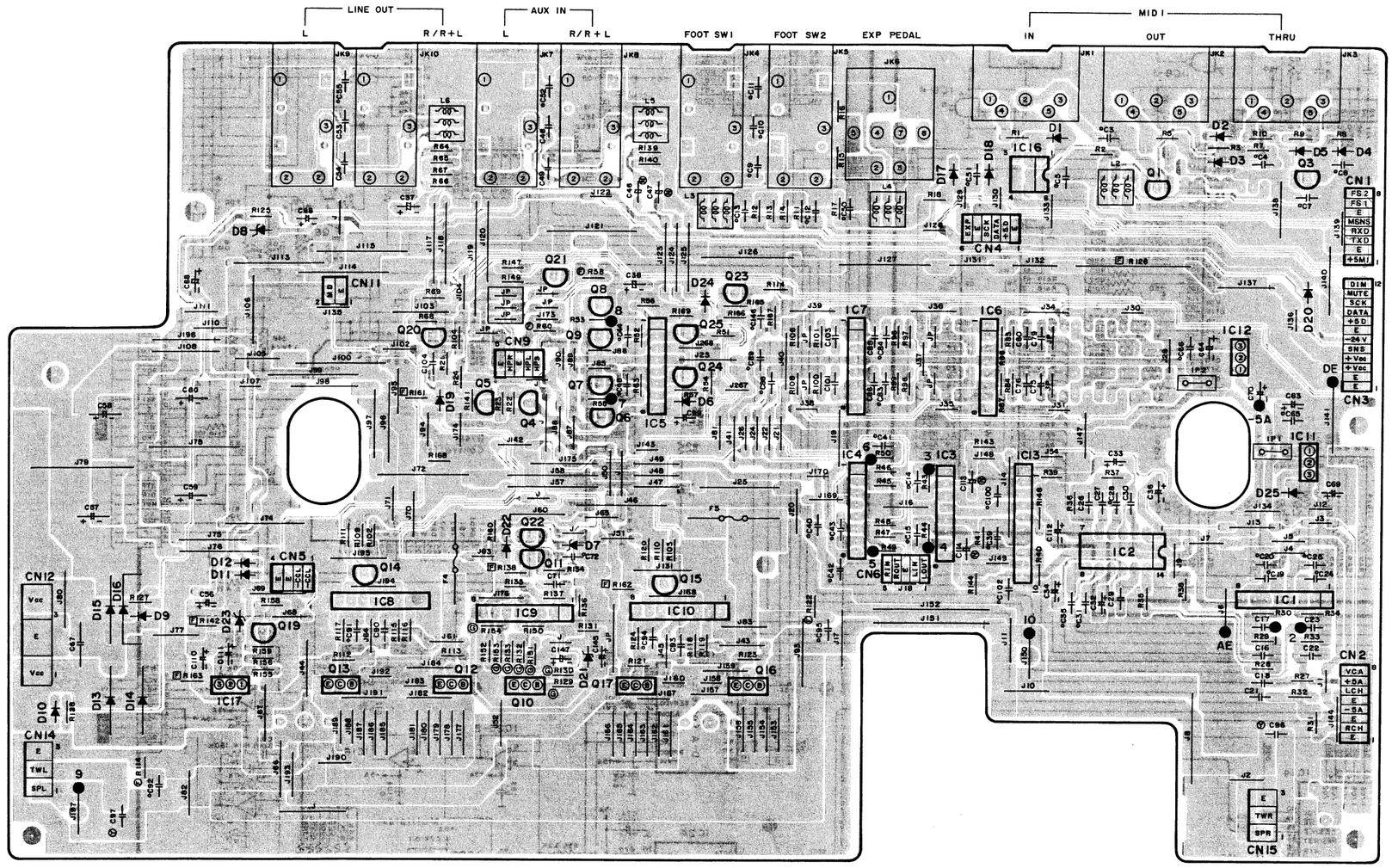
D-A Converter

Multiplexer

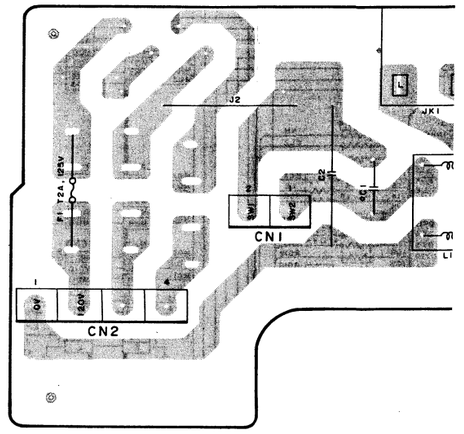
FILTER & AMP, AC POWER SUPPLY AND HEADPHONES, BEND CIRCUIT BOARD

FAJ

- [M] [MC] [XM] areas **SXPG215331**
- [EZ] area **SXPG215341**
- Others **SXPG215311**



ACP [M] [MC] [XM] areas **SXPG21643**



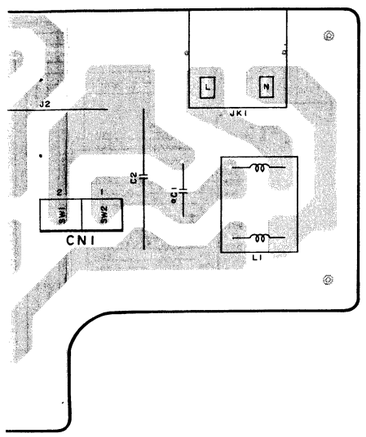
• FUSE
F1: XBA

FAJ

NOTES:

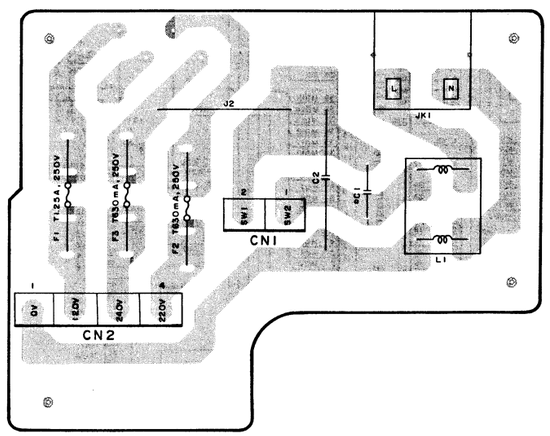
- IC'S
  - IC1, 3~10: SVIGM5218L
  - IC2: SVIGLM1894N
  - IC11: M5F7805L
  - IC12, 17: M5F7905L
  - IC13: SVIGM5241L
  - IC16: SVIGTLP513
- TRANSISTORS
  - Q1, 3, 4, 20, 23: 2SA1015-GR
  - Q5, 11, 19, 21: 2SC1815GR
  - Q6, 8: 2SC3940ARS
  - Q7, 9: 2SA1534ARS
  - Q10: 2SD1266
  - Q12, 16: 2SA1643
  - Q13, 17: 2SC4327
  - Q14, 15, 24, 25: 2SK381CD
  - Q22: 2SJ105GR
- DIODES
  - D1~5, 17~20, 22, 24, 25: MA165
  - D6: EK04
  - D7, 23: MA4082
  - D8: MA4220M
  - D9, 10, 11, 12: SVDGERA1502
  - D13, 14, 15, 16: SVDS3V20
  - D21: MA4051MTA

(M] areas **SXPG216431**



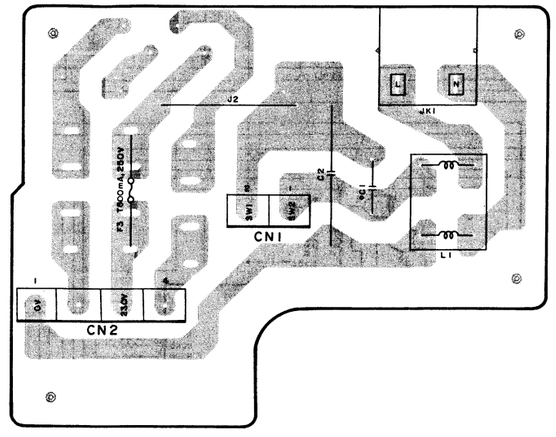
• FUSE
F1: XBA1C20NU100

ACP [EK] [X] [XR] [XS] [XD] [XT] areas **SXPG216441**



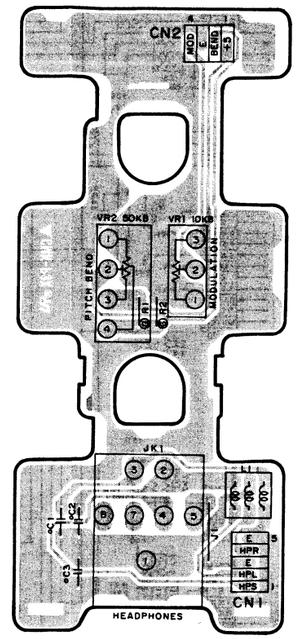
• FUSE
F1: XBA2C12TB0
F2, 3: XBA2C06TB0

ACP Other areas **SXPG216431**



• FUSE
F3: XBA2C08TB0

HB **SXPG216411B**

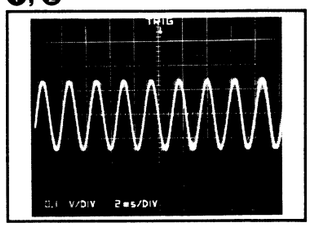


■ Measuring Conditions

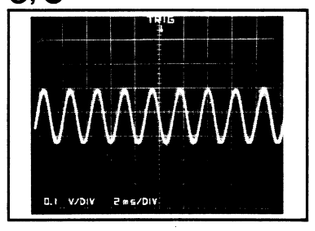
Check Point ❶~❽
Set to the self-diagnostic mode followings.
- While pressing E3 key and E4 key simultaneously, turn on the power switch.
- Main Volume..... Max
- Keyboard A3
- Sound Button..... SYNTH LEAD

Check Point ❾, ❿
- Main Volume..... Center

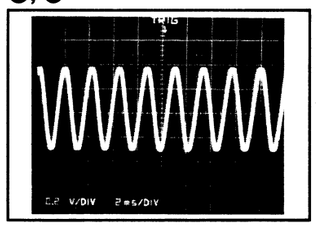
❶, ❷



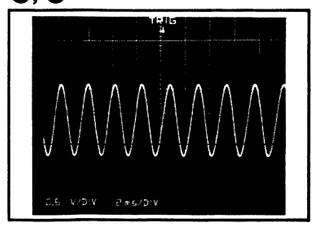
❸, ❹



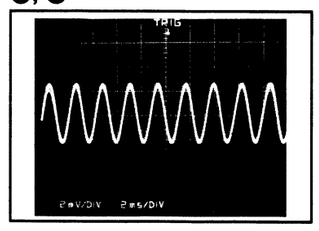
❺, ❻



❼, ❽



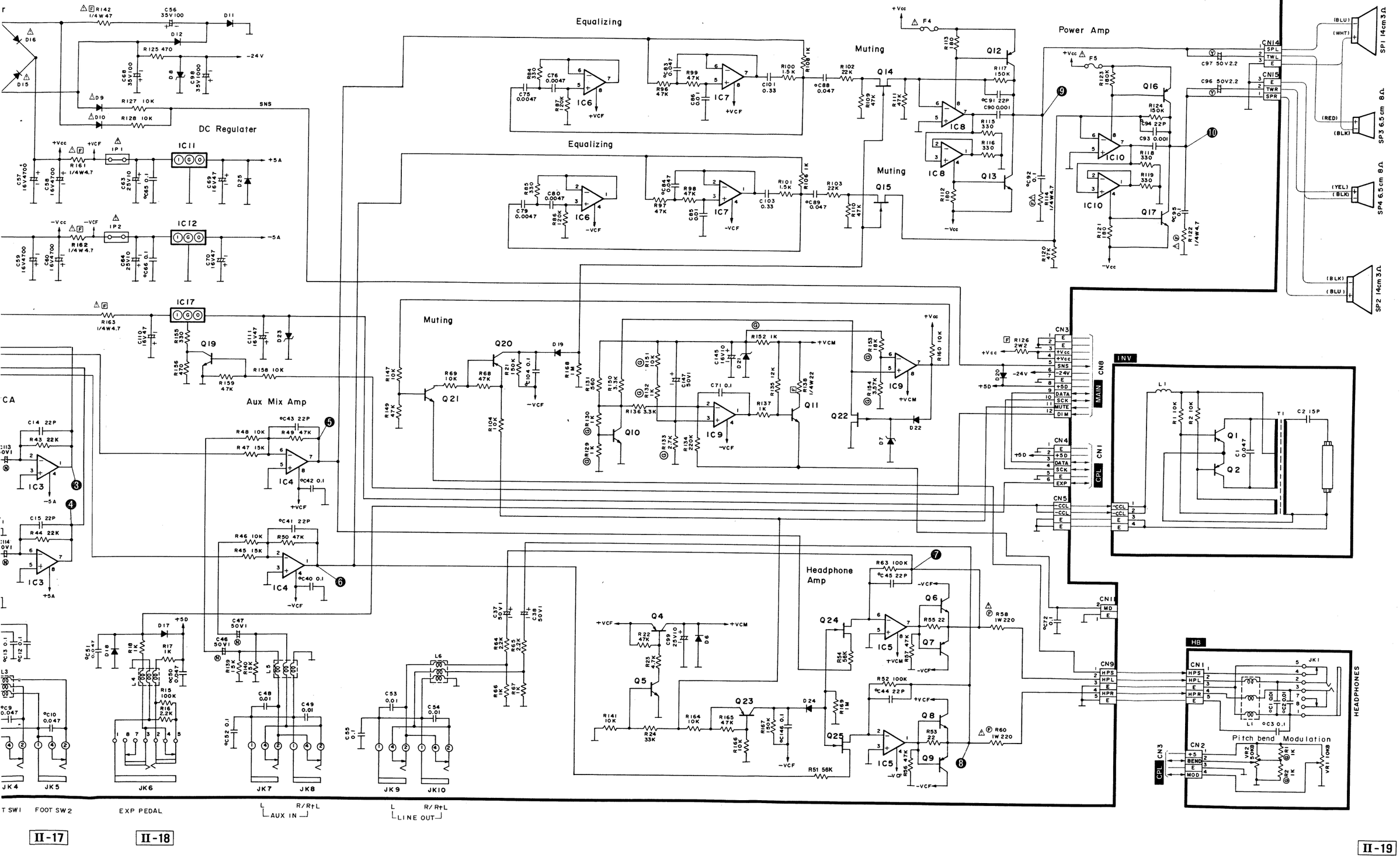
❾, ❿



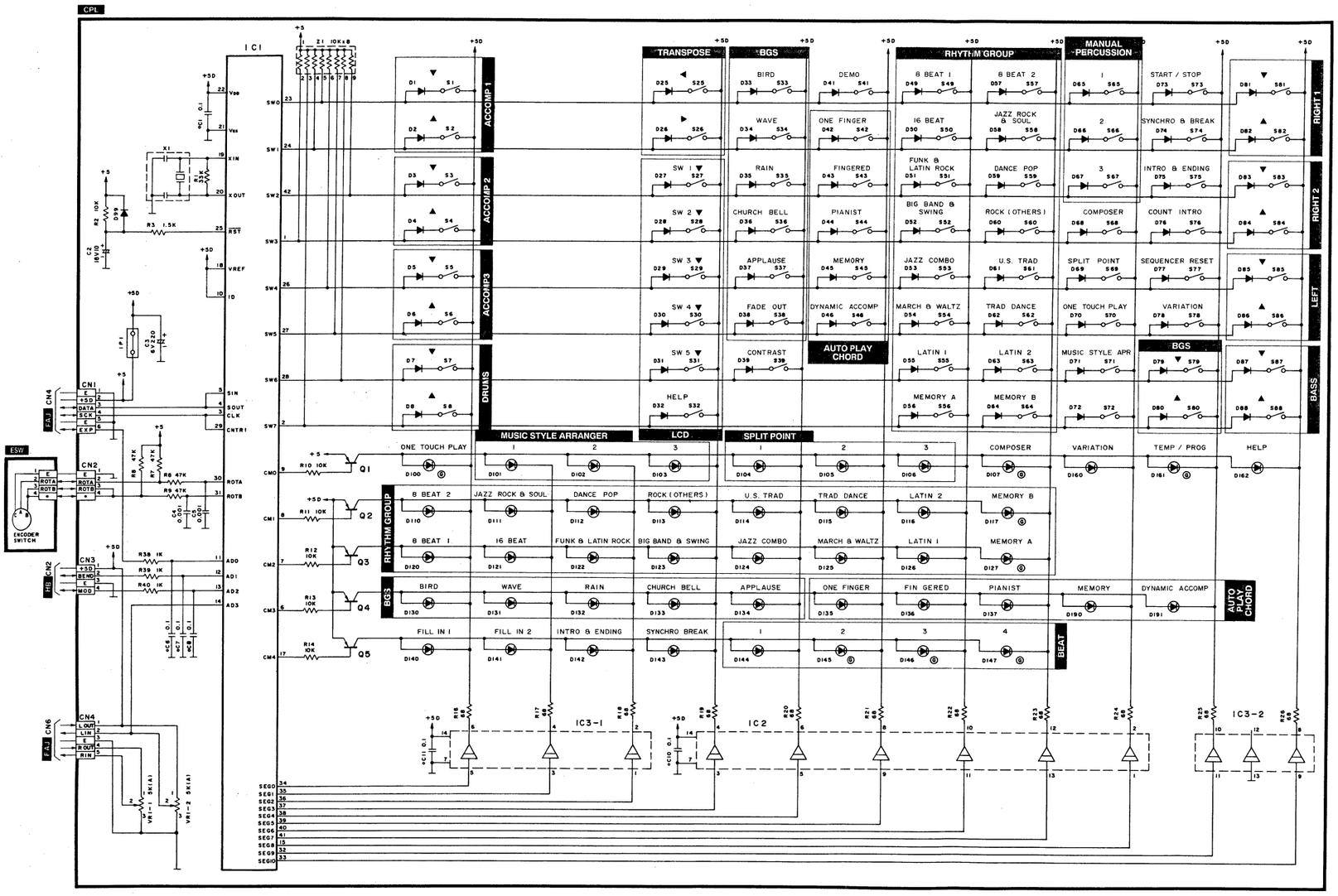
FILTER & AMP, HEADPHONES BEND,INVERTER AND AC POWER SUPPLY CIRCUIT DIA

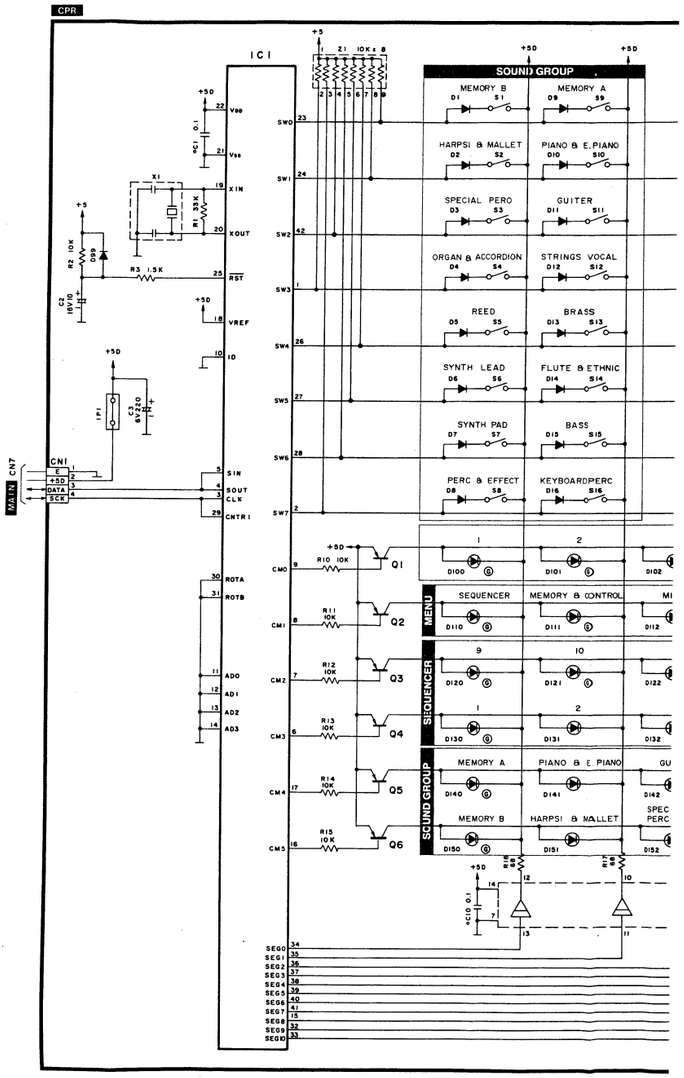
HEADPHONES BEND, INVERTER AND AC POWER SUPPLY CIRCUIT DIAGRAM

5 6 7 8 9 10 11 12 13 14



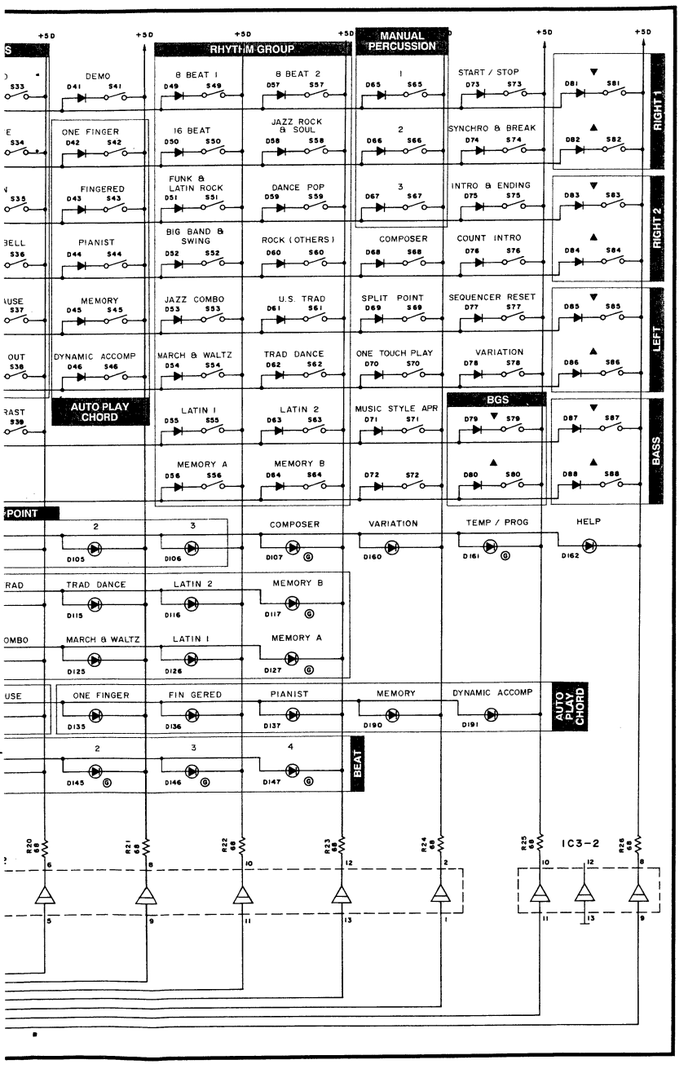
CPL CPR ESW CONTROL PANEL LEFT, RIGHT AND ENCODER SWITCH CIRCUIT DIAGRAM

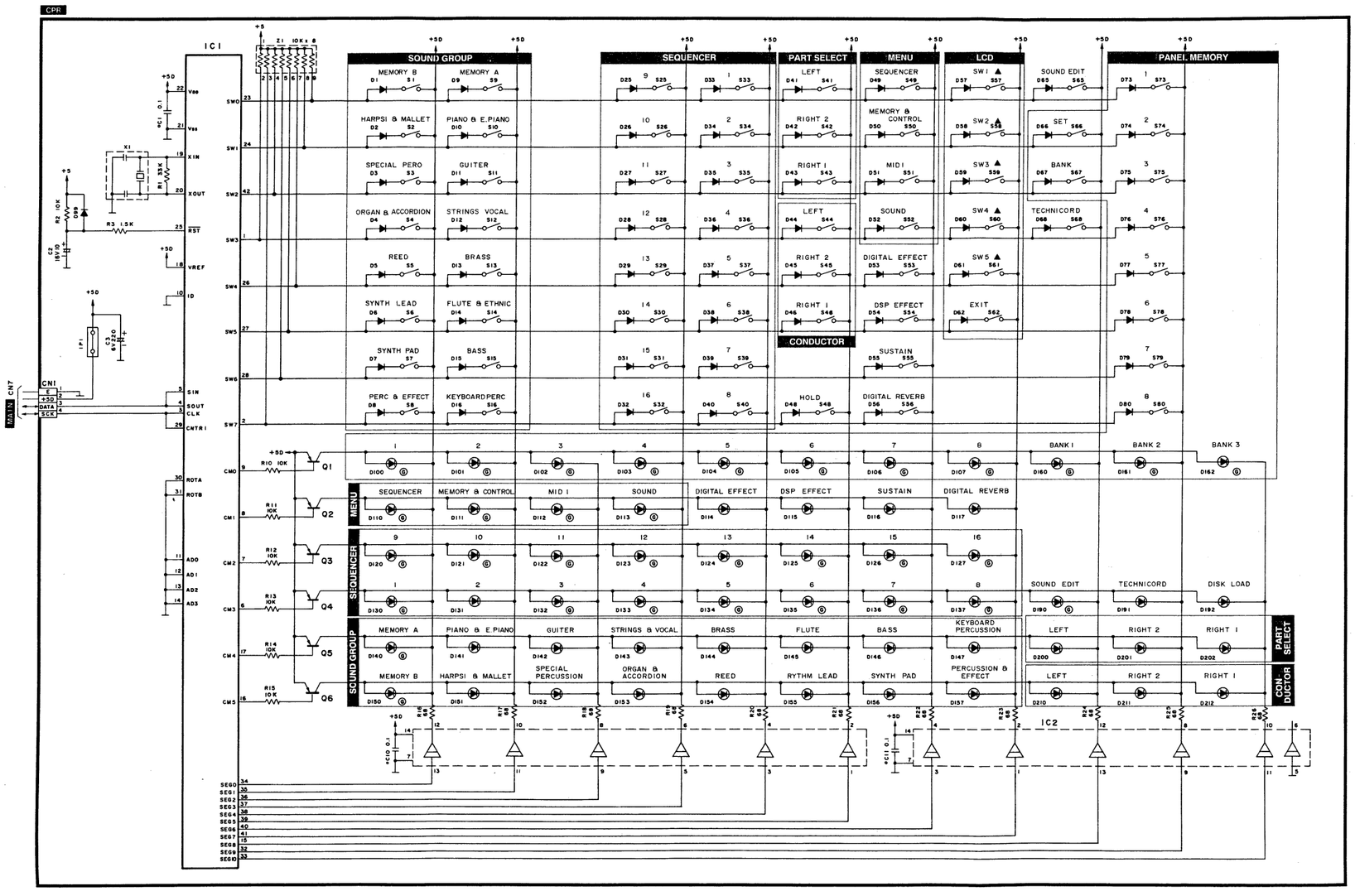




T, RIGHT AND ENCODER SWITCH CIRCUIT DIAGRAM

5 6 7 8 9 10 11 12 13 14

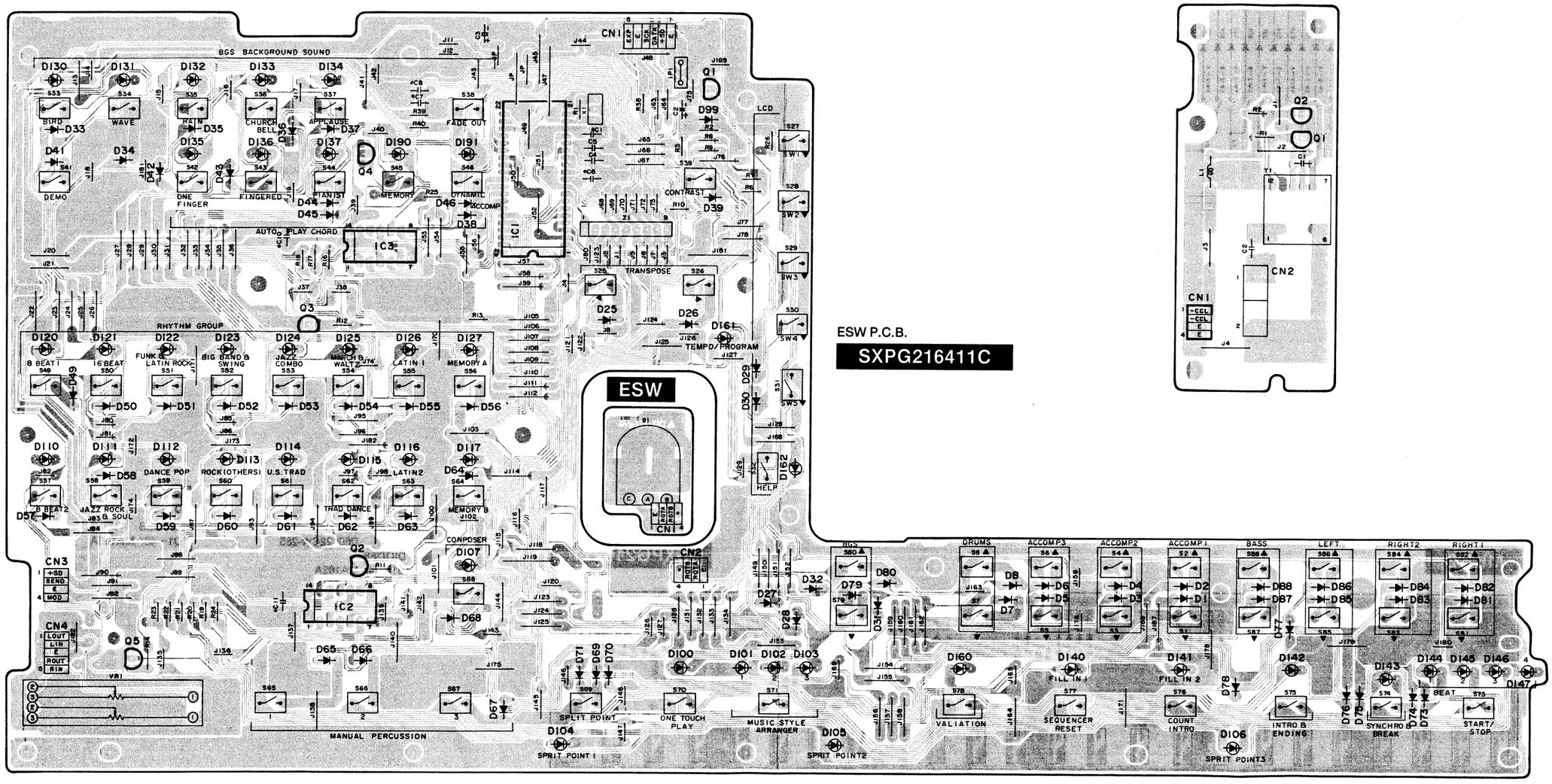




CONTROL PANEL LEFT, RIGHT, ENCODER SWITCH AND INVERTER CIRCUIT BOARD

CPL

SXPG215211A



ESW P.C.B.

SXPG216411C

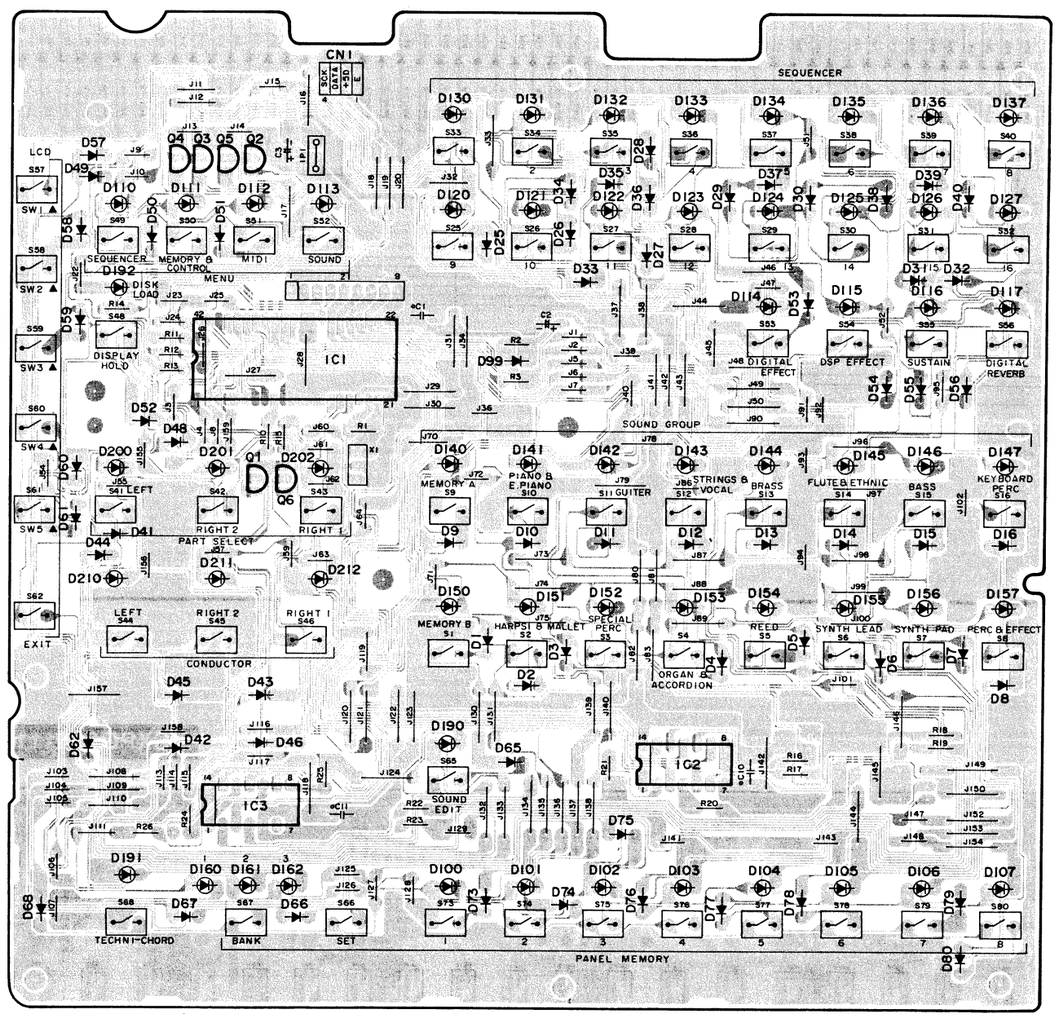
INV

SXPG215211C

10 11 12 13 14 15 16 17 18 19

CPR

SXPG215211B



CPL

NOTES:

- IC'S
  - IC1: M37471M2142S
  - IC2, 3: HD74LS07P
- TRANSISTORS
  - Q1~3, 5: 2SA1015-GR
  - Q4: 2SA830SB
- DIODES
  - D1~8, 25~39, 41~46, 49~71, 73~88, 99: MA165
  - D100, 107, 117, 127, 145~147, 161: SEL4417GM
  - D101~106, 110~116, 120~126, 130~137, 140~144, 160, 162, 190, 191: SEL4117RM

CPR

NOTES:

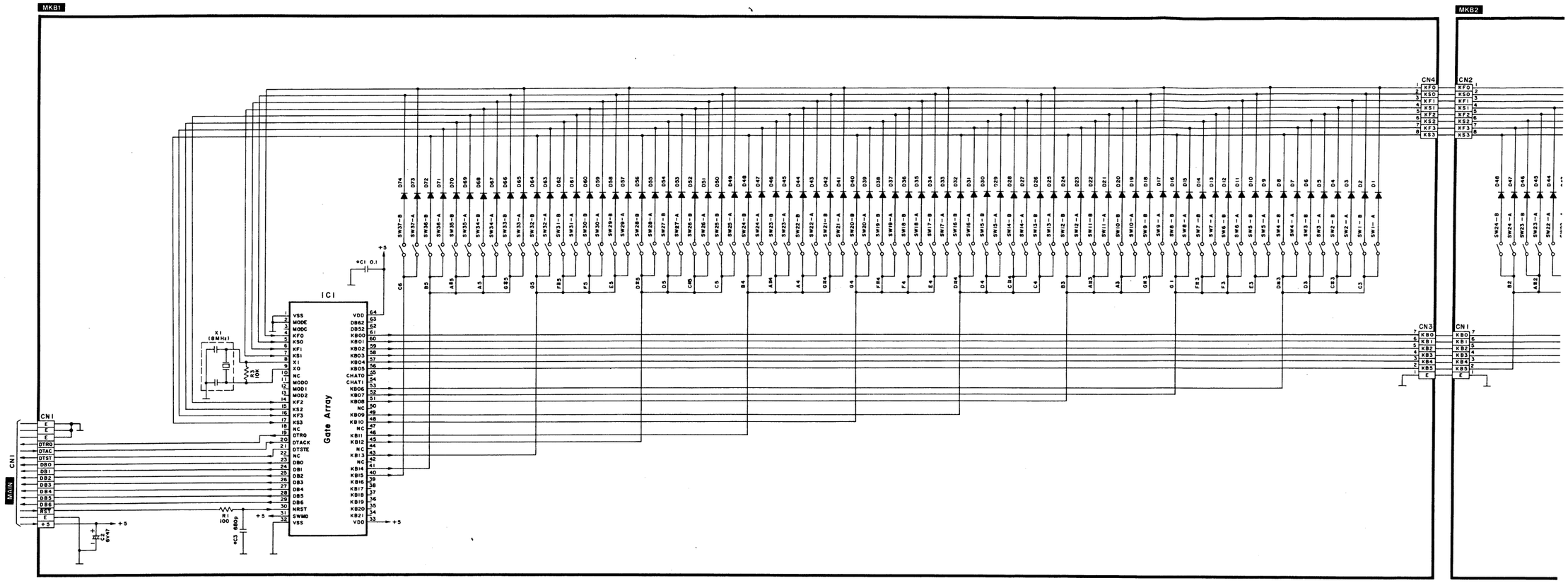
- IC'S
  - IC1: M37471M2142S
  - IC2, 3: HD74LS07P
- TRANSISTORS
  - Q1, 6, 3, 4: 2SA830SB
  - Q2, 5: 2SA1015-GR
- DIODES
  - D1~16, 25~46, 48~68, 73~80, 99: MA165
  - D100~107, 110~113, 120~127, 130~137, 140, 150, 160~162, 190: SEL4417GM
  - D114~117, 141~147, 151~157, 191, 192, 200~202, 210~212: SEL4117RM

INV

NOTES:

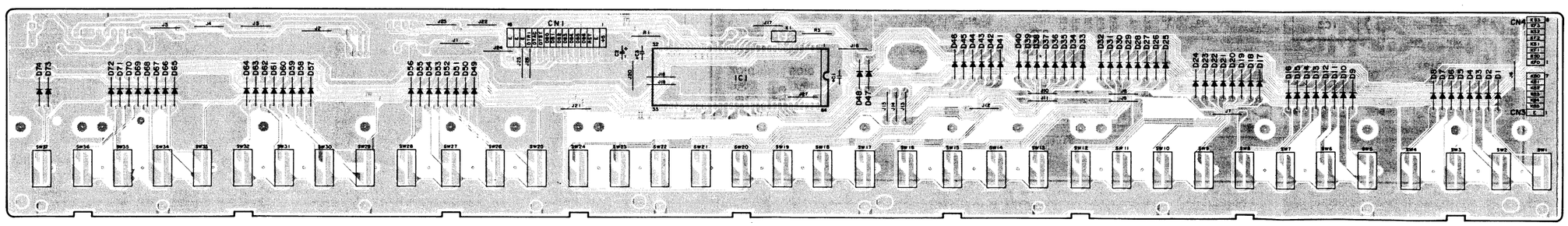
- TRANSISTORS
  - Q1, 2: 2SA1534ARS

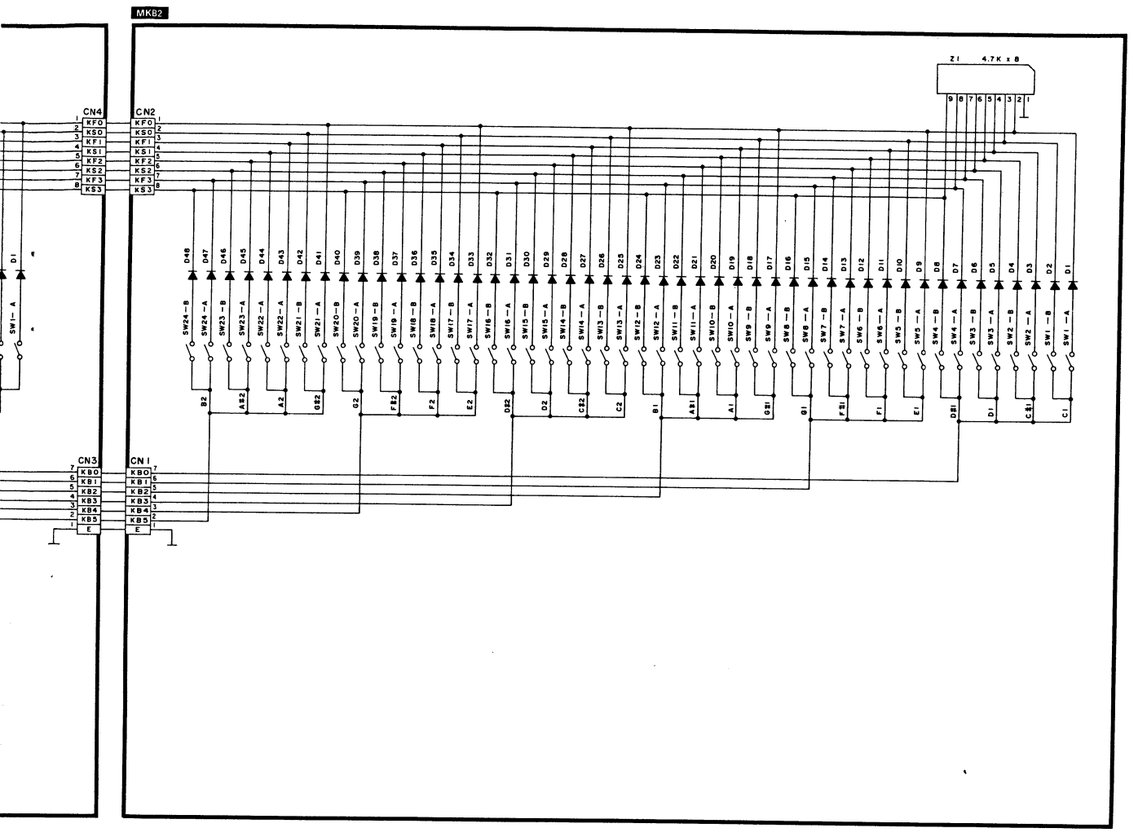
MKB1 MKB2 MANUAL KEYBOARD 1, 2 CIRCUIT DIAGRAM AND CIRCUIT BOARD



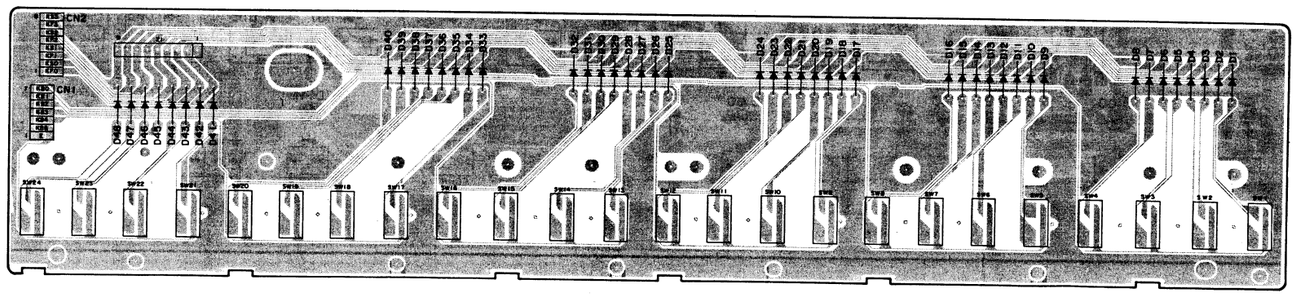
MKB1

SXPG216111





MKB2



SXPG216211

MKB1

NOTES:

- IC'S
  IC1: D65022CW-285
- DIODES
  D1~74: MA162A

MKB2

NOTES:

- DIODES
  D1~48: MA162A

REPLACEMENT PARTS LIST.....P.C.B. and Wiring Parts

Notes:

1. The marking (RTL) indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retension period of availability is dependant on the type of assembly, and in accordance with the laws governing part and product retention.
   After the end of this period, the assembly will no longer be available.
2. Important safety notice
   Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
3. The "S" mark is service standard parts and may differ from production parts.
4. ○ mark are new parts.
5. For part No. with area mark, check the area when placing an order.

■ PRINTED CIRCUIT BOARD

	RTL	Area	Part No.	Description	P/S
○	RTL	Others	SXPG215111	MAIN	1
○	RTL	M XM	SXPG215131	MAIN	1
○	RTL	EZ EW EA	SXPG215141	MAIN	1
○	RTL	MC	SXPG215151	MAIN	1
○	RTL	Others	SXPG216411A	ACP	1
○	RTL	M MC XM	SXPG216431A	ACP	1
○	RTL	EK X XR XS XD XT	SXPG216441A	ACP	1
○	RTL	Others	SXPG215311	FAJ	1
○	RTL	M MC XM	SXPG215331	FAJ	1
○	RTL	EZ	SXPG215341	FAJ	1
○	RTL		SXPG216411B	HB	1
○	RTL		SXPG215211A	CPL	1
○	RTL		SXPG215211B	CPR	1
○	RTL		SXPG216411C	ESW	1
○	RTL		SXPG215211C	INV	1
○	RTL		SXPG216311	TG	1
○	RTL		SXPG216111	MKB1	1
○	RTL		SXPG216211	MKB2	1

MAIN MAIN CIRCUIT

	Ref. No.	Part No.	Description	P/S
		INTEGRATED CIRCUITS		
○	IC1	D70236GD125B	16 bit Microcomputer	1
○	IC2	D65046GD188	Gate Array	1
○	IC3	QSIGCK2000AX	4M bit EP ROM	1
○	IC4	QSIGCK2000BX	4M bit EP ROM, Others	1
○	IC4	QSIGCK2000BZ	4M bit EP ROM, EZ EW EA only	1
○	IC6	QSIG03C16015	16M bit Rtythm Pattern ROM	1
	IC7	ATT7C256BF85	256K bit Static RAM	1
○	IC8, 9	M5M411664J8S	1M bit D-RAM	1
○	IC10	SED1330FBA	LCD Driver	1
○	IC11	TC7W14F	Inverter	1
	IC12	HM65256BLF10	256K bit Pseudo Static RAM	1
○	IC13	D72068GF-3B9	Floppy Disk Controller	1
	IC14	D6382GF-3B9	Digital Signal Processor	1
	IC16	M5218AFP	Operational Amplifier	1
○	IC17	TC7S86F	2 INPUT OR Gate	1
	IC18	TC25540AF006	Tone Generator LSI	1
○	IC19	QSIGM3C16194	16M bit Wave ROM	1
○	IC20	QSIGM3C16193	16M bit Wave ROM	1
	IC22, 23	HM65256BLF10	256K bit Pseudo Static RAM	2
	IC24	PCM1702U	D-A Converter	1
	IC25	M5238FP	Operational Amplifier	1
	IC26	T74H4051AF	8-channel Multiplexer	1
	IC27	M5218AFP	Operational Amplifier	1
	IC28	M74HC244FP	3-State Buffers	1
○	IC29	TC7S32F	2 INPUT OR Gate	1
	IC30	PCM1702U	D-A Converter	1
○	IC31	TC7S66F	Analog Switch	1
		TRANSISTORS		
	Q1, 6	2SB709ARTW	Transistor	2
	Q2, 5	2SD601AQTW	Transistor	2
	Q3	2SA1643	Transistor	1
S	Q4	2SC1815GR	Transistor	1
		DIODES		
	D1	MA704WK	Diode	1
	D2, 4, 6, 11~14	MA110	Diode	7
○	D3	MA151WK	Diode	1
	D5	MA2062LF	Zener, 6.2V	1
	D7	MA8056	Zener, 5.6V	1
○	D8	MA738	Diode	1
○	D9	MA8051	Zener, 5.1V	1
○	D10	MA8180	Zener, 18V	1
		OSCILLATORS		
○	X1	QSXG1A2500A	25MHz, Quartz Oscillator	1
	X2	QSXG1I4915A	49MHz, Quartz Oscillator	1
	X3	EF0EC8004A5	8MHz, Ceramic Oscillator	1
○	X4	QSXG1I3200A	32MHz, Quartz Oscillator	1
		COMPONENT COMBINATIONS		
○	Z1	EXBV8V472J	4.7kΩ×4	1
○	Z2, 3	EXBV8V101J	100Ω×4	2
	Z4~6	EXBS8V221J	220Ω×4	3
○	Z7~15	EXBV8V221J	220Ω×4	9
	Z16~27, 29	EXBS8V221J	220Ω×4	13
	Z30~32	EXBV8V471J	470Ω×4	3
	Z33, 34, 51	EXBS8V471J	470Ω×4	3
	Z35~46	EXBV8V471J	470Ω×4	12
	Z47	EXBS8V472J	4.7kΩ×4	1
○	Z48~50	EXBV8V472J	4.7kΩ×4	3
		COILS		
○	L1	QLQGT1T230KA	Coil	1
○	L2	QLBG003A	Coil	1
	L4~6, 9, 10	QLQGT3T150SA	Coil	5
	L8, 11	QLQGT1B800MA	Coil	2
		RESISTORS		
	R1, 2	ERJ6GEYJ472V	4.7kΩ	2
	R3	ERJ6GEYJ102V	1kΩ	1
	R5	ERJ6GEYJ102V	1kΩ	1
	R6	ERJ6GEYJ333V	33kΩ	1

Ref. No.	Part No.	Description	P/S
R8~23	ERJ6GEYJ472V	4.7kΩ	16
R24	ERJ6GEYJ102V	1kΩ	1
R25	ERJ6GEYJ104V	100kΩ	1
R26	ERJ6GEYJ224V	220kΩ	1
R27	ERJ6GEYJ103V	10kΩ	1
R28, 29	ERJ6GEYJ472V	4.7kΩ	2
R30	ERJ6GEY0R00V	0Ω	1
R31	ERJ6GEYJ472V	4.7kΩ	1
○ R32	ERJ6GEYJ330V	33Ω	1
R33~35	ERJ6GEYJ472V	4.7kΩ	3
R36, 37	ERJ6GEYJ221V	220Ω	2
R38	ERJ6GEYJ471V	470Ω	1
R39, 40	ERJ6GEYJ101V	100Ω	2
R41, 42	ERJ6GEYJ221V	220Ω	2
R43, 44	ERJ6GEYJ102V	1kΩ	2
R45, 46	ERJ6GEYJ221V	220Ω	2
R47	ERJ6GEYJ101V	100Ω	1
R48	ERJ6GEYJ472V	4.7kΩ	1
○ R50	ERJ6GEYJ153V	15kΩ	1
R51	ERJ6GEYJ101V	100Ω	1
R52	ERJ6GEYJ331V	330Ω	1
R53	ERJ6GEYJ471V	470Ω	1
R54	ERJ6GEYJ103V	10kΩ	1
R55	ERJ6GEYJ332V	3.3kΩ	1
R56	ERJ6GEYJ101V	100Ω	1
○ R57	ERJ6GEYJ474V	470kΩ	1
R58, 59	ERJ6GEYJ334V	330kΩ	2
R60~65	ERJ6GEYJ154V	150kΩ	6
R67	ERJ6GEYJ683V	68kΩ	1
R68	ERJ6GEYJ823V	82kΩ	1
R69, 70	ERJ6GEYJ104V	100kΩ	2
R71	ERJ6GEYJ154V	150kΩ	1
R72	ERJ6GEYJ334V	330kΩ	1
R73	ERJ6GEYJ104V	100kΩ	1
R74	ERJ6GEYJ683V	68kΩ	1
R75	ERJ6GEYJ823V	82kΩ	1
R76	ERJ6GEYJ104V	100kΩ	1
R77	ERJ6GEYJ154V	150kΩ	1
R78	ERJ6GEYJ334V	330kΩ	1
R80	ERJ6GEYJ472V	4.7kΩ, M XM only	1
R82	ERJ6GEY472V	4.7kΩ	1
R83	ERJ6GEYJ473V	47kΩ	1
R84	ERJ6GEYJ221V	220Ω	1
R85	ERJ6GEYJ472V	4.7kΩ	1
R86	ERJ6GEYJ331V	330Ω	1
R87	ERJ6GEYJ332V	3.3kΩ	1
R88	ERJ6GEYJ221V	220Ω	1
R90	ERJ6GEYJ472V	4.7kΩ	1
R92	ERJ6GEYJ221V	220Ω	1
R93, 94	ERJ6GEYJ472V	4.7kΩ	2
R95	ERJ6GEYJ471V	470Ω	1
R96	ERJ6GEYJ103V	10kΩ	1
R97	ERJ6GEYJ221V	220Ω	1
R98	ERJ6GEYJ331V	330Ω	1
R99	ERJ6GEYJ473V	47kΩ	1
R100, 101	ERJ6GEYJ221V	220Ω	2
R102~104	ERJ6GEYJ472V	4.7kΩ	3
R105	ERJ6GEYJ221V	220Ω	1
R106	ERJ6GEYJ102V	1kΩ	1
R107	ERJ6GEYJ221V	220Ω	1
○ R108	ERTD2ZHK153	15kΩ	1
R110	ERJ6GEYJ472V	4.7kΩ	1
R111	ERJ6GEYJ472V	4.7kΩ, except M XM	1
R112, 113	ERJ6GEYJ472V	4.7kΩ	2
R114, 115	ERJ6GEYJ101V	100Ω	2
R116	ERJ6GEYJ224V	220kΩ	1
○ R117	ERJ6GEYJ684V	680kΩ	1

Ref. No.	Part No.	Description	P/S
CAPACITORS			
○ C3	ECUV1H331JG	330pF	1
C4	ECUV1H104ZFX	0.1μF	1
C5	ECEA1HKA010	1μF, 50V	1
C6	ECUV1H104ZFX	0.1μF	1
C8, 9	ECUV1H104ZFX	0.1μF	2
C10	ECEA0JKA470	47μF, 6.3V	1
C11, 12	ECUV1H104ZFX	0.1μF	2
C14	ECUV1H101JG	100pF	1
C15	ECUV1H104ZFX	0.1μF	1
C25, 26	ECUV1H104ZFX	0.1μF	2
C27	ECEA0JKA101	100μF, 6.3V	1
C28~32	ECUV1H104ZFX	0.1μF	5
C35	ECUV1H104ZFX	0.1μF	1
C38, 39	ECUV1H104ZFX	0.1μF	2
C40	ECUV1H102JX	0.001μF	1
○ C41	ECUV1E224ZFX	0.22μF	1
C42~46	ECUV1H104ZFX	0.1μF	5
○ C47, 48	ECUV1H333KBX	0.033μF	2
C49	ECEA1CKA100	10μF, 16V	1
C50, 51	EECS5R5V105	1F, 5.5V, Memory Back-up	2
C57	ECUV1H104ZFX	0.1μF	1
C58	ECEA0JKA470	47μF, 6.3V	1
C60	ECUV1H104ZFX	0.1μF	1
C63	ECUV1H104ZFX	0.1μF	1
C65	ECUV1H104ZFX	0.1μF	1
C67, 68	ECUV1H104ZFX	0.1μF	2
C70, 71	ECUV1H104ZFX	0.1μF	2
C72	ECEA1CKA100	10μF, 16V	1
C73	ECEA0JKA470	47μF, 6.3V	1
C74	ECEA1CKA100	10μF, 16V	1
C75	ECEA0JKA470	47μF, 6.3V	1
C76	ECEA0JKA101	100μF, 6.3V	1
C77	ECUV1H104ZFX	0.1μF	1
○ C78	ECUV1H682KBG	0.0068μF	1
C79~81	ECUV1H104ZFX	0.1μF	3
C82	ECUV1H103KBG	0.01μF	1
C83	ECUV1H104ZFX	0.1μF	1
○ C85~91	ECUV1H222KX	0.0022μF	7
C92, 93	ECUV1H104ZFX	0.1μF	2
C94	ECUV1H102JX	0.001μF	1
C95	ECUV1H470JG	47pF	1
C96	ECUV1H102JX	0.001μF	1
C97	ECUV1H470JG	47pF	1
C98, 99	ECUV1H104ZFX	0.1μF	2
C100	ECUV1H101JG	100pF	1
C102	ECSS1EF106	10μF, 25V	1
C103	ECUV1H104ZFX	0.1μF	1
C104	ECEA0JU102	1000μF, 6.3V	1
C105	ECUV1H104ZFX	0.1μF	1
C106	ECEA0JKA101	100μF, 6.3V	1
C107, 108	ECUV1H104ZFX	0.1μF	2
○ C109, 110	ECUV1H100DCN	10pF	2
C111	ECUV1H104ZFX	0.1μF	1
C112, 113	ECUV1H060DCN	6pF	2
○ C114	ECUV1H100DCN	10pF	1
○ C116	ECUV1H331JG	330pF	1
C117, 118	ECUV1H104ZFX	0.1μF	2
C119	ECEA0JKA470	47μF, 6.3V	1
C120	ECEA0JKA101	100μF, 6.3V	1
C121	ECEA0JKA470	47μF, 6.3V	1
○ C122	ECUV1H331JG	330pF	1
C123	ECUV1H104ZFX	0.1μF	1

ACP AC POWER SUPPLY CIRCUIT

	Ref. No.		Part No.	Description	P/S
			LINE FILTER		
	L1	⚠	SLTGLF3	Line Filter	1
			JACK		
	JK1	⚠	SJVD0203B	AC Inlet	
			FUSES		
	F1	⚠	XBA1C20NU100	T2A, 125V, M MC XM	1
	F1	⚠	XBA2C12TB0	T1.25A, 250V, EK X XR XS XD XT	1
	F2, 3	⚠	XBA2C06TB0	T630mA, 250V, EK X XR XS XD XT	2
	F3	⚠	XBA2C08TB0	T800mA, 250V EN EZ EW EF EA EH EP XL	1
			CAPACITORS		
	C1	⚠	ECKCVA1472MF	4700pF, Line Capacitor	1
	C2	⚠	ECQU2A104MN	0.1μF, 250V, Across-the Line Capacitor	1

FAJ FILTER & AMP CIRCUIT

	Ref. No.	Part No.	Description	P/S
		INTEGRATED CIRCUITS		
S	IC1, 3~10	SVIGM5218L	Operational Amplifier	9
	IC2	SVIGLM1894N	Dynamic Noise Reduction	1
	IC11	M5F7805L	Voltage Regulator	1
○	IC12, 17	M5F7905L	−5V Voltage Regulator	2
	IC13	SVIGM5241L	Dual VCA	1
	IC16	SVIGTLP513	Photo Coupler	1
		TRANSISTORS		
S	Q1, 3, 4, 20, 23	2SA1015-GR	2SA933STRS (SUB. Part)	5
S	Q5, 11, 19, 21	2SC1815GR	Transistor	4
	Q6, 8	2SC3940ARS	Transistor	2
	Q7, 9	2SA1534ARS	Transistor	2
	Q10	2SD1266	Transistor	1
	Q12, 16	2SA1643	Transistor	2
○	Q13, 17	2SC4327	Transistor	2
	Q14, 15, 24, 25	2SK381CD	FET	4
	Q22	2SJ105GR	FET	1
		DIODES		
	D1~5, 17~20, 22, 24, 25	MA165	Diode	11
	D6	EK04	Diode	1
	D7, 23	MA4082	Zenner, 8.2V	2
○	D8	MA4220M	Zener, 22V	1
	D9, 10, 11, 12 ⚠	SVDGERA1502	Rectifier	4
	D13, 14, 15, 16 ⚠	SVDS3V20	Rectifier	4
	D21	MA4051MTA	Zener, 5.1V	1
		COILS		
	L2~6	QLQGT3T150SA	Coil	5
		JACKS		
	JK1~3	SJSG1370A	MIDI THRU, OUT, IN	3
	JK4, 5	QJJG003AA	FOOT SW1, 2	2
	JK6	SJJG100A	EXP PEDAL	1
	JK7~10	QJJG003AA	LINE OUT, AUX IN	4
		IC PROTECTORS		
○	IP1, 2	ICP-N15T104	IC Protector	2
		FUSES		
	F4, 5 ⚠	XBA2C20TB0	T2A, 250V, except M MC XM	2
○	F4, 5 ⚠	XBA1C25NU100	T2.5A, 125V, M MC XM only	2
		RESISTORS		
	R1	ERDS2TJ221	220Ω	1
	R2	ERDS2TJ102	1kΩ	1
	R3	ERDS2TJ221	220Ω	1
	R5	ERDS2TJ101	100Ω	1
	R7, 8	ERDS2TJ104	100kΩ	2
	R9	ERDS2TJ221	220Ω	1
	R10	ERDS2TJ101	100Ω	1
	R11, 12	ERDS2TJ102	1kΩ	2
	R13, 14	ERDS2TJ103	10kΩ	2
	R15	ERDS2TJ104	100kΩ	1
	R16	ERDS2TJ222	2.2kΩ	1
	R17, 18	ERDS2TJ102	1kΩ	2
	R21	ERDS2TJ154	150kΩ	1
	R22	ERDS2TJ473	47kΩ	1
	R23	ERDS2TJ472	4.7kΩ	1
	R24	ERDS2TJ333	33kΩ	1
	R27	ERDS2TJ331	330Ω	1
	R28~30	ERDS2TJ332	3.3kΩ	3
	R31	ERDS2TJ331	330Ω	1
	R32~34	ERDS2TJ332	3.3kΩ	3
	R35	ERDS2TJ331	330Ω	1
	R36	ERDS2TJ681	680Ω	1
	R37, 38	ERDS2TJ331	330Ω	2
	R39, 40	ERDS2TJ103	10kΩ	2
	R41	ERDS2TJ822	8.2kΩ	1
	R43, 44	ERDS2TJ223	22kΩ	2
	R45	ERDS2TJ153	15kΩ	1
	R46	ERDS2TJ103	10kΩ	1
	R47	ERDS2TJ153	15kΩ	1
	R48	ERDS2TJ103	10kΩ	1
	R49, 50	ERDS2TJ473	47kΩ	2
	R51	ERDS2TJ563	56kΩ	1
	R52	ERDS2TJ104	100kΩ	1
	R53	ERDS2TJ220	22Ω	1
	R54	ERDS2TJ563	56kΩ	1
	R55	ERDS2TJ220	22Ω	1
	R56, 57	ERDS2TJ473	47kΩ	2
○	R58 ⚠	ERG1SJ221	220Ω, 1W	1
○	R60 ⚠	ERG1SJ221	220Ω, 1W	1
	R63	ERDS2TJ104	100kΩ	1
	R64, 65	ERDS2TJ222	2.2kΩ	2
	R66, 67	ERDS2TJ102	1kΩ	2
	R68	ERDS2TJ473	47kΩ	2
	R69	ERDS2TJ103	10kΩ	2
	R84, 85	ERDS2TJ331	330Ω	2
	R86, 87	ERDS2TJ124	120kΩ	2
	R96~99	ERDS2TJ473	47kΩ	4
	R100, 101	ERDS2TJ152	1.5kΩ	2
	R102, 103	ERDS2TJ223	22kΩ	2
	R104	ERDS2TJ103	10kΩ	1
	R106, 108	ERDS2TJ102	1kΩ	2
	R109~111	ERDS2TJ473	47kΩ	3
	R112, 113	ERDS2TJ181	180Ω	2
	R114 ⚠	ERD25FVJ4R7	4.7Ω, 1/4W, Flame-Proof	1

Ref. No.	Part No.	Description	P/S
R115, 116	ERDS2TJ331	330Ω	2
R117	ERDS2TJ154	150kΩ	1
R118, 119	ERDS2TJ331	330Ω	2
R120	ERDS2TJ473	47kΩ	1
R121	ERDS2TJ181	180Ω	1
R122 ⚠	ERD25FVJ4R7	4.7Ω, 1/4W, Flame-Proof	1
R123	ERDS2TJ184	180kΩ	1
R124	ERDS2TJ154	150kΩ	1
R125	ERDS2TJ471	470Ω	1
○ R126 ⚠	ERQ2CJP2R0S	2Ω, 2W, Fuse Type	1
R127, 128	ERDS2TJ103	10kΩ	2
R129, 130	ER0S2CKF1001	1kΩ, ±1%	2
R131	ERDS2TJ561	560Ω	1
R132	ER0S2CKF1001	1kΩ, ±1%	1
○ R133	ER0S2CKF2701	2.7kΩ, ±1%	1
R134	ERDS2TJ224	220kΩ	1
R135	ERDS2TJ123	12kΩ	1
R136	ERDS2TJ332	3.3kΩ	1
R137	ERDS2TJ102	1kΩ	1
R138	ERD2FCVG220	22Ω, 1/4W, Fuse Type	1
R139, 140	ERDS2TJ153	15kΩ	2
R141	ERDS2TJ103	10kΩ	1
R142 ⚠	ERD2FCVJ4R7	4.7Ω, 1/4W, Fuse Type	1
R143, 144	ERDS2TJ472	4.7kΩ	2
R147	ERDS2TJ103	10kΩ	1
R148	ERDS2TJ122	1.2kΩ	1
R149	ERDS2TJ473	47kΩ	1
R150	ERDS2TJ332	3.3kΩ	1
○ R151	ER0S2CKF1002	10kΩ, ±1%	1
R152	ERDS2TJ102	1kΩ	1
○ R153	ER0S2CKF1802	18kΩ, ±1%	1
○ R154	ER0S2CKF3571	3.57kΩ, ±1%	1
R155	ERDS2TJ331	330Ω	1
R156	ERDS2TJ471	470Ω	1
R158	ERDS2TJ103	10kΩ	1
R159	ERDS2TJ473	47kΩ	1
R160	ERDS2TJ103	10kΩ	1
R161～163 ⚠	ERD2FCVJ4R7	4.7Ω, 1/4W, Fuse Type	3
R164	ERDS2TJ103	10kΩ	1
R165	ERDS2TJ473	47kΩ	1
R166	ERDS2TJ103	10kΩ	1
R167	ERDS2TJ154	150kΩ	1
R168, 169	ERDS2TJ105	1MΩ	1
CAPACITORS			
C3	ECKF1E473ZV	0.047μF	1
C4	ECCF1H221J	220pF	1
C5	ECRF1H104ZF	0.1μF	1
C7	ECKF1E473ZV	0.047μF	1
C8	ECCF1H221J	220pF	1
C9～11	ECKF1E473ZV	0.047μF	3
C12, 13	ECRF1H104ZF	0.1μF	2
C14, 15	ECCF1H220J	22pF	1
C16, 17	ECQG1H332KZ	0.0033μF	2
C18	ECQB1H153JF	0.015μF	1
C19	ECCF1H681J	680pF	1
C20	ECRF1H104ZF	0.1μF	1
C21	ECQB1H153JF	0.015μF	1
C22, 23	ECQG1H332KZ	0.0033μF	2
C24	ECCF1H681J	680pF	1
C25	ECRF1H104ZF	0.1μF	1
C26	ECQG1H332KZ	0.0033μF	1
C27	ECQG1H102KZ	0.001μF	1
C28	ECRF1H104ZF	0.1μF	1
C29, 30	ECQG1H472KZ	0.0047μF	2
C31	ECRF1H104ZF	0.1μF	1
C32	ECEA1CKA100	10μF, 16V	1

Ref. No.	Part No.	Description	P/S
C33, 34	ECEA1HKA010	1μF, 50V	2
C35	ECKF1E473ZV	0.047μF	1
C36	ECEA0JU102	1000μF, 6.3V	1
C37, 38	ECEA1HKA010	1μF, 50V	2
C39, 40	ECRF1H104ZF	0.1μF	2
C41	ECCF1H220J	22pF	1
C42	ECRF1H104ZF	0.1μF	1
C43～45	ECCF1H220J	22pF	3
C46, 47	ECEA1HKN010	1μF, 50V	2
C48, 49	ECQB1H103JF	0.01μF	2
C50, 51	ECKF1E473ZV	0.047μF	2
C52	ECRF1H104ZF	0.1μF	1
C53, 54	ECQB1H103JF	0.01μF	2
C55	ECRF1H104ZF	0.1μF	1
C56	ECEA1VU101	100μF, 35V	1
C57～60	ECEA1CU472	4700μF, 16V	4
C63, 64	ECEA1EKA100	10μF, 25V	2
C65, 66	ECRF1H104ZF	0.1μF	2
C67 ⚠	ECQE1A104M6	0.1μF, 125V	1
C68	ECEA1VU101	100μF, 35V	1
C69, 70	ECEA1CKA470	47μF, 16V	2
C71	ECQV1H104JM	0.1μF	1
C72	ECRF1H104ZF	0.1μF	1
C75, 76	ECQG1H472KZ	0.0047μF	2
C79, 80	ECQG1H472KZ	0.0047μF	2
C83, 84	ECKF1E473ZV	0.047μF	2
C85, 86	ECQB1H103JF	0.01μF	2
C88, 89	ECKF1E473ZV	0.047μF	2
C90	ECQG1H102KZ	0.001μF	1
C91	ECCF1H220J	22pF	1
C92	ECRF1H104ZF	0.1μF	1
C93	ECQG1H102KZ	0.001μF	1
C94	ECCF1H220J	22pF	1
C95	ECRF1H104ZF	0.1μF	1
C96, 97	ECEA50Y2R2	2.2μF, 50V	1
C98	ECEA1VU102	1000μF, 35V	1
C99	ECEA1EKA100	10μF, 25V	1
C100	ECRF1H104ZF	0.1μF	1
C101	ECQV1H334JM	0.33μF	1
C102	ECRF1H104ZF	0.1μF	1
C103	ECQV1H334JM	0.33μF	1
C104	ECRF1H104ZF	0.1μF	1
C110, 111	ECEA1CKA470	47μF, 16V	2
C112	ECEA0JKA221	220μF, 6.3V	1
C113, 114	ECEA1HKN010	1μF, 50V	1
C145	ECEA1CKA100	10μF, 16V	1
C146	ECRF1H104ZF	0.1μF	1
C147	ECEA1HKA010	1μF, 50V	1

HB HEADPHONES CIRCUIT

Ref. No.	Part No.	Description	P/S
COIL			
L1	QLQGT3T150SA	Coil	1
JACK			
JK1	SJJG100A	Jack	1
VARIABLE RESISTORS			
VR1	EVA07115B14G	10kΩ, B MODULATION	1
VR2	EVA07015B54G	50kΩ, B PITCH BEND	1

Ref. No.	Part No.	Description	P/S
RESISTORS			
R1, 2	ER0S2CKF1001	1kΩ, ±1%	2
CAPACITORS			
C1, 2	ECCF1H331J	330pF	2
C3	ECRF1H104ZF	0.1μF	1

Ref. No.	Part No.	Description	P/S
CAPACITORS			
C1	ECRF1H104ZF	0.1μF	1
C2	ECEA1CKA100	10μF, 16V	1
C3	ECEA0JKA221	220μF, 6.3V	1
C4, 5	ECQG1H102KZ	0.001μF	2
C6~8	ECRF1H104ZF	0.1μF	3
C10, 11	ECRF1H104ZF	0.1μF	2

CPL UPPER CONTROL PANEL LEFT CIRCUIT

	Ref. No.	Part No.	Description	P/S
INTEGRATED CIRCUITS				
○	IC1	M37471M2142S	8 bit Microcomputer	1
	IC2, 3	HD74LS07P	Hex Buffers	2
TRANSISTORS				
S	Q1~3, 5	2SA1015-GR	2SA933STRS (SUB. Part)	4
	Q4	2SA830SB	Transistor	1
DIODES				
	D1~8, 25~39, 41~46, 49~71, 73~88, 99	MA165	Diode	69
	D100, 107, 117, 127, 145~147, 161	SEL4417GM	LED (GREEN)	8
	D101~106, 110~116, 120~126, 130~137, 140~144, 160, 162, 190, 191	SEL4117RM	LED (RED)	37
OSCILLATOR				
	X1	EF0EC4004A3	4MHz, Ceramic Oscillator	1
COMPONENT COMBINATION				
	Z1	EXBPI8103JM	10kΩ×8	1
SWITCHES				
	S1~8, 25~39, 41~46, 49~71, 73~88	EVQ21507K	Push Switch	68
IC PROTECTOR				
	IP1 ⚠	ICP-N10T104	IC Protector	1
VARIABLE RESISTOR				
	VR1	QRVG30P02A53	5kΩ, A	1
RESISTORS				
	R1	ERDS2TJ333	33kΩ	1
	R2	ERDS2TJ103	10kΩ	1
	R3	ERDS2TJ152	1.5kΩ	1
	R6~9	ERDS2TJ473	47kΩ	4
	R10~14	ERDS2TJ103	10kΩ	5
	R16~26	ERDS2TJ680	68Ω	11
	R38~40	ERDS2TJ102	1kΩ	3

CPR UPPER CONTROL PANEL RIGHT CIRCUIT

	Ref. No.	Part No.	Description	P/S
INTEGRATED CIRCUITS				
○	IC1	M37471M2142S	8 bit Microcomputer	1
	IC2, 3	HD74LS07P	Hex Buffers	2
TRANSISTORS				
S	Q1, 6, 3, 4	2SA830SB	Transistor	4
S	Q2, 5	2SA1015-GR	2SA933STRS (SUB. Part)	2
DIODES				
	D1~16, 25~46, 48~68, 73~80, 99	MA165	Diode	66
	D100~107, 110~113, 120~127, 130~137, 140, 150, 160~162, 190	SEL4417GM	LED (GREEN)	34
	D114~117, 141~147, 151~157, 191, 192, 200~202, 210~212	SEL4117RM	LED (RED)	26
OSCILLATOR				
	X1	EF0EC4004A3	4MHz, Ceramic Oscillator	1
COMPONENT COMBINATION				
	Z1	EXBPI8103JM	10kΩ×8	1
SWITCHES				
	S1~16, 25~46, 48~62, 65~68, 73~80	SSHG1049A	Push Switch	65
IC PROTECTOR				
	IP1 ⚠	ICP-N10T104	IC Protector	1
RESISTORS				
	R1	ERDS2TJ333	33kΩ	1
	R2	ERDS2TJ103	10kΩ	1
	R3	ERDS2TJ152	1.5kΩ	6
	R10~15	ERDS2TJ103	10kΩ	6
	R16~26	ERDS2TJ680	68Ω	11
CAPACITORS				
	C1	ECRF1H104ZF	0.1μF	1
	C2	ECEA1CKA100	10μF, 16V	1
	C3	ECEA0JKA221	220μF, 6.3V	1
	C10, 11	ECRF1H104ZF	0.1μF	2

ESW ENCODER SWITCH

Ref. No.	Part No.	Description	P/S
SWITCH			
S1	SSRG110A	Encoder Switch	1

INV INVERTER CIRCUIT

	Ref. No.	Part No.	Description	P/S
TRANSISTORS				
	Q1, 2	2SA1534ARS	Transistor	2
TRANSFORMER				
○	T1	QTDG002A	Transformer	1
COIL				
	L1	QLCGTJR10KA	Coil	1
RESISTORS				
	R1, 2	ERDS2TJ103	10kΩ	2
CAPACITORS				
○	C1	ECHS1473JZW	0.047μF	1
○	C2	ECCD3F180KGE	18pF	1

TG TONE GENERATOR CIRCUIT

	Ref. No.	Part No.	Description	P/S
INTEGRATED CIRCUITS				
	IC1	TC25540AF006	Tone Generator LSI	1
○	IC2	QSIGH3C16D81	16M bit Wave ROM	1
	IC6	M74HC00FP	Quad 2-input NAND Gates	1
	IC7	M74HC74FP	Dual D-type Flip-Flop	1
COMPONENT COMBINATIONS				
	Z1~5, 13~15	EXBV8V471J	470Ω×4	8
	Z6~12	EXBS8V471J	470Ω×4	7
RESISTORS				
	R1~3	ERJ6GEYJ221V	220Ω	3
	R4	ERJ6GEYJ103V	10kΩ	1
	R7	ERJ6GEYJ221V	220Ω	1
CAPACITORS				
	C8	ECEA0JKA101	100μF, 6.3V	1
	C9~16	ECUV1H104ZFX	0.1μF	8
	C19, 20	ECUV1H104ZFX	0.1μF	2
	C21	ECUV1H101JG	100pF	1
	C22, 37	ECUV1H104ZFX	0.1μF	2

MKB1 MANUAL KEYBOARD 1 CIRCUIT

	Ref. No.	Part No.	Description	P/S
INTEGRATED CIRCUIT				
	IC1	D65022CW-285	Gate Array	1
DIODES				
S	D1~74	MA162A	MA150IR (SUB. Part)	74
OSCILLATOR				
	X1	EF0EC8004A5	8MHz, Ceramic Oscillator	1
RESISTORS				
	R1	ERDS2TJ101	100Ω	1
	R3	ERDS2TJ103	10kΩ	1
CAPACITORS				
	C1	ECRF1H104ZF	0.1μF	1
	C2	ECEA0JU470	47μF, 6.3V	1
	C3	ECCF1H681J	680pF	1

MKB2 MANUAL KEYBOARD 2 CIRCUIT

	Ref. No.	Part No.	Description	P/S
DIODES				
S	D1~48	MA162A	MA150IR (SUB. Part)	48
COMPONENT COMBINATION				
	Z1	EXBPI8472JM	4.7kΩ×8	1

■ WIRING PARTS

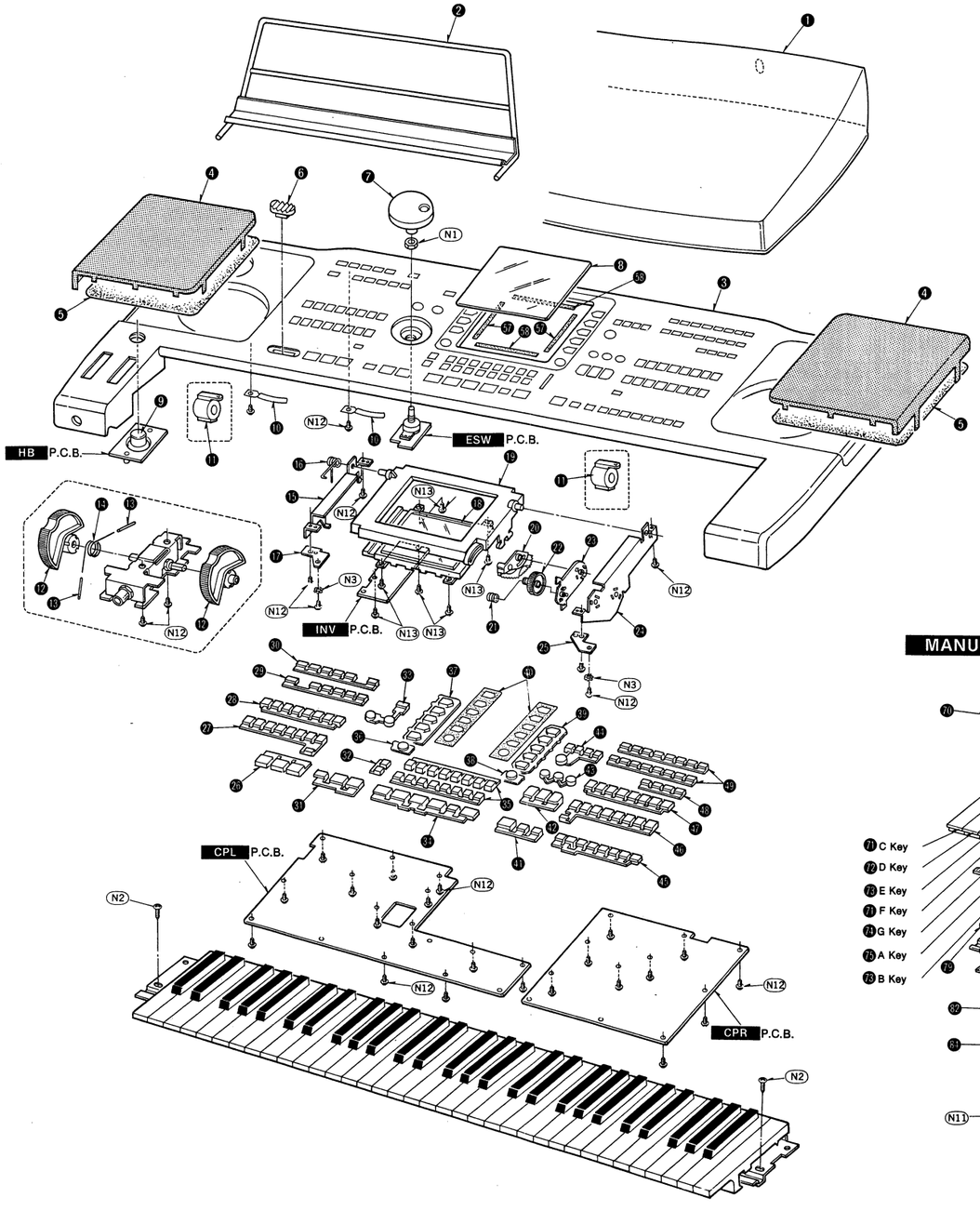
	Ref. No.	Part No.	Description	P/S
○	W1	QEXGSS05055B	Connector with Wire	1
○	W2	QEXGSS04040A	Connector with Wire	1
	W3	QEXGSS06055A	Connector with Wire	1
○	W4	QEXGSS05100A	Connector with Wire	1
○	W5	QEXGVH03050B	Connector with Wire	1
○	W6	QEXGVH03055C	Connector with Wire	1
○	W7	QEXGVH03035B	Connector with Wire	1
○	W8	QEXGSS16015A	Connector with Wire	1
○	W9	QEXGSS04020A	Connector with Wire	1
○	W10	QEXGSS04006A	Connector with Wire	1
○	W11	QEXGSS04045A	Connector with Wire	1

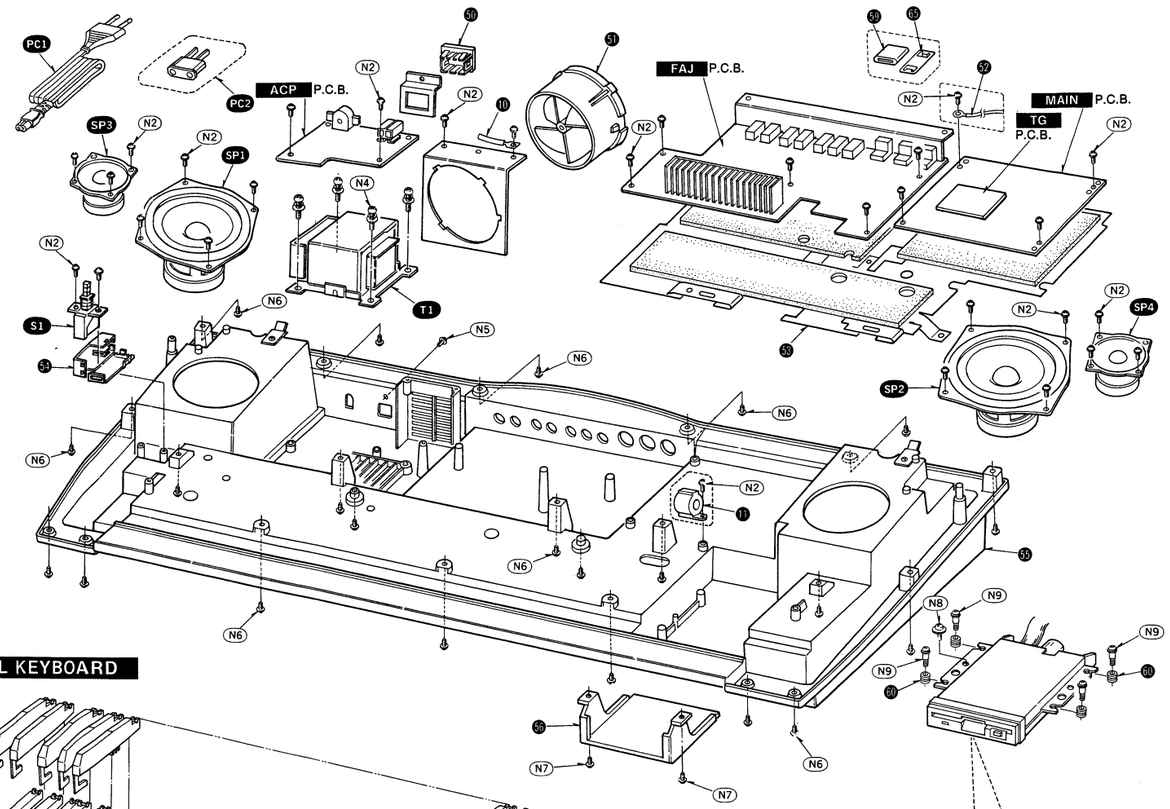
CABINET PARTS LOCATION

1 2 3 4 5 6 7 8 9

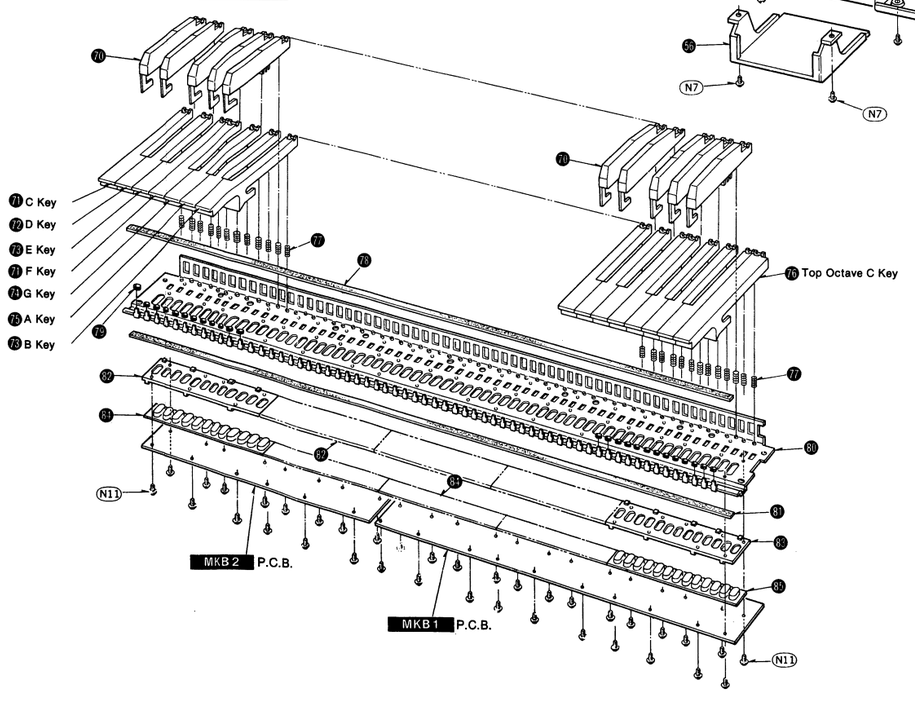
A B C D E F

CABINET





MANUAL KEYBOARD



REPLACEMENT PARTS LIST.....Cabinet and Chassis Parts

Notes:

1. The marking (RTL) indicates that the Retention Time is limited for this item. After the discontinuation of this assembly in production, the item will continue to be available for a specific period of time. The retension period of availability is dependant on the type of assembly, and in accordance with the laws governing part and product retention.
   After the end of this period, the assembly will no longer be available.
2. ○ mark are new parts.
3. Important safety notice
   Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
4. For part No. with area mark, check the area when placing an order.
5. The raw material indication for synthtic resin
   In order to facilitate classification of parts of synthetic resin manufacture and to promote the recycling of natural resources, a raw material symbol for such parts is indicated in the Ref. No./Material column.

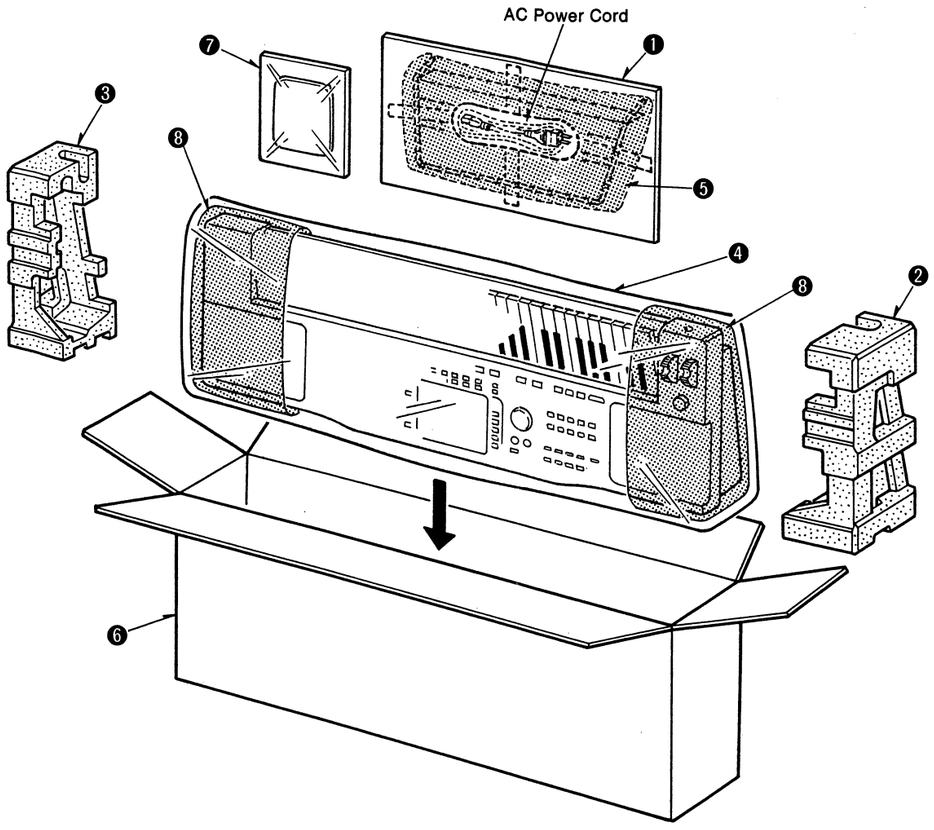
■ CABINET & CHASSIS PARTS

Ref. No.	Part No.	Description	P/S
SWITCH			
S1 ⚠	ESB823V	Power Switch	1
SPEAKERS			
○ SP1, 2	EAS14PL96A	14cm, 3Ω	2
SP3, 4	EAS65PH31A3	6.5cm, 8Ω	2
TRANSFORMER			
○ T1	QTPG1M020A	Power Transformer, Others	1
○ T1	QTPG1M026A	Power Transformer, M MC XM	1
○ T1	QTPG1M021A	Power Transformer, EK X XR XS XD XT	1
POWER CORD & PLUG			
PC1 ⚠	SJAG65	Power Cord, Others	1
PC1 ⚠	QJAG013AA	Power Cord, M MC XM only	1
○ PC1	QJAG014AA	Power Cord, XR XL	1
PC1 ⚠	VJA0733	Power Cord, EK XD only	1
PC2 ⚠	SJP5213-1	Attachment Plug, X XT only	1
CABINET PARTS			
1	SQCG402A	Dust Cover	1
2	QYAG3001AA	Music Rack	1
○ 3 PS	QGPG0056AB	Control Panel	1
○ 4	QGMG0010AA	Panching Net	2
○ 5	QKNG1016A02	Speaker Net	2
6	SBNG7070B	Knob, Main Volume	1
○ 7	QGUG3002AB	Dial Wheel	1
○ 8	QKWG011AA	LCD Cover	1
○ 9	QGUG1219AA	Button	1
10	SUWG219	Binder	3
11	QLZG005A	Core, EZ M MC XM only	3
12	SBNG4050A	Wheel Knob	2
13	SHGG5010A	Tube	2
14	SUSG570A	Spring	1
○ 15	QMAG0094AA	Bracket	1
○ 16	QMBG006AA	Spring	1
○ 17	QSCG056A	Shield	1
○ 18	QSLG011AA	LCD	1
○ 19 PS	QMNG0027AA	LCD Holder	1
○ 20	QMRG7042AA	LCD Lever	1
○ 21	QMBG008AA	LCD Spring	1
○ 22	QGUG3003AA	LCD Knob	1

Ref. No.	Part No.	Description	P/S
○ 23	QMRG7043AA	LCD Base	1
○ 24	QMAG0102AA	Bracket	1
○ 25	QSCG057A	Shield	1
○ 26	QGUG1212AA	Button	1
○ 27	QGUG1206AA	Button	1
○ 28	QGUG1205AA	Button	1
○ 29	QGUG1202AA	Button	1
○ 30	QGUG1201AA	Button	1
○ 31	QGUG1213AA	Button	1
○ 32	QGUG1218AA01	Button	1
○ 33	QGUG1211AA01	Button	1
○ 34	QGUG1208AA	Button	1
○ 35	QGUG1217AA01	Button	2
○ 36	QGUG1200AA	Button	1
○ 37	QGUG1199AA	Button	1
○ 38	QGUG1197AA	Button	1
○ 39	QGUG1198AA	Button	1
○ 40	QMFG4100BA	Felt	2
○ 41	QGUG1209AA	Button	1
○ 42	QGUG1216AA	Button	1
○ 43	QGUG1215AA	Button	1
○ 44	QGUG1214AA	Button	1
○ 45	QGUG1210AA	Button	1
○ 46	QGUG1207AA	Button	1
○ 47	QGUG1206AA	Button	1
○ 48	QGUG1204AA	Button	1
○ 49	QGUG1203AA	Button	2
50 ⚠ PS	SJS9231A	AC Inlet Cover, Others	1
50 ⚠ PS	SJS9334A	AC Inlet Cover, M MC XM XL XR	1
51	SYE1128-4	Fan	1
○ 52	QEXGRA01028B	Earth Line, M XM MC EZ	1
○ 53	QSCG054A	Shield	1
54 PP	SHRG8390A	Cover, Power SW.	1
○ 55 PS	QYKG127AA	Bottom Plate, EK X XR XS XD XT	1
○ 55 PS	QYKG127BB	Bottom Plate, Others	1
56 PS	QMQG0019AA	FD Cover	1
○ 57	QMRG5044AA	Sponge	2
○ 58	QMRG5045AA	Sponge	2
○ 59	QLZG009A	Core, M MC XM only	1
60	QMGG029AA	Floating Rubber	4
61	EME213DVA	DDR Drive Unit	1
○ 62	QEUGMQW10D	Flat Cable	1
63	QMFG1095AA	Felt	1
64	QMAG0093AA	FDD Bracket	1
○ 65	QMRG1011AA	Stopper, M MC XM only	1

Ref. No.	Part No.	Description	P/S
MANUAL KEYBOARD			
○ 70 AS	STBG2071A	Black Key	25
○ 71 AS	STBG1101A	White Key (C and F Key)	10
○ 72 AS	STBG1111A	White Key (D Key)	5
○ 73 AS	STBG1121A	White Key (E and B Key)	10
○ 74 AS	STBG1131A	White Key (G Key)	5
○ 75 AS	STBG1141A	White Key (A Key)	5
○ 76 AS	STBG1151A	White Key (Top Octave C Key)	1
77	SUSG270A	Spring	61
○ 78	QMFG1119BA	Felt	1
79	SHGG9052A	Key Guide Rubber	61
○ 80	QMWG3006BA	Chassis	1
○ 81	QMFG1120BA	Felt	1
○ 82 ABS	QMWG8031AA	Spacer (13pcs. on one)	4
○ 83 ABS	QMWG8030AA	Spacer (12pcs. on one)	1
○ 84	QMWG6010BA	Rubber Switch (12pcs. on one)	4
○ 85	QMWG6009BA	Rubber Switch (13pcs. on one)	1
SCREWS & WASHERS			
N1	XNS9	Nut	1
N2	XTW3+10Q	Screw	31
○ N3	XWC3C	Washer	2
N4	QHDG002AA	Screw with Washer	4
N4	XYN4+F16S	Screw with Washer	4
○ N5	XTB3+16JFZ	Screw	1
N6	XTW3+16JFZ	Screw	22
N7	XTW3+10QFZ	Screw	2
○ N8	QHDG025AA	Screw with Washer	1
N9	QHDG023AA	Screw with Washer	4
N10	XSS3+6FZ	Screw	4
○ N11	XTW3+10FVC	Screw	37
N12	XTV3+10G	Screw	32
N13	XTWSG2	Screw with Washer	6

PACKING



■ PACKING PARTS

	Ref. No.		Part No.	Description	P/S
	1		QPGG0195AA	Card Board	1
○	2	PS	QPNG0378AB	Pad	1
○	3	PS	QPNG0379AB	Pad	2
	4	PE	QPFG002AA	Polyethylene Bag	2
	5	PE	SPHG1770A	Polyethylene Bag	1
○	6		QPGG0236A	Carton	1
	8	PE	QPHG007AA	Polyethylene Bag	2
	OPERATING INSTRUCTION MANUAL				
○	7		QQFGKN2000AA	Operating Instruction Manual, EN	1
○	7-1		QQTG0182A	NORSK	1
○	7-2		QQTG0183A	SVENSKA	1
○	7-3		QQTG0184A	DANSK	1
○	7-4		QQTG0185A	SUOMI	1
○	7		QQFGKN2000BA	Operating Instruction Manual, M	1
○	7-1		QQTG0186A	ENGLISH	1
○	7		QQFGKN2000CA	Operating Instruction Manual, MC	1
○	7-1		QQTG0187A	ENGLISH	1
○	7-2		QQTG0188A	FRANCAIS	1
○	7		QQFGKN2000DA	Operating Instruction Manual, EK XL XE XS XD	1
○	7-1		QQTG0187A	ENGLISH	1
○	7		QQFGKN2000EA	Operating Instruction Manual, EA EZ	1
○	7-1		QQTG0189A	DEUTSCH	1
○	7		QQFGKN2000FA	Operating Instruction Manual, EW	1
○	7-1		QQTG0188A	FRANCAIS	1
○	7-2		QQTG0189A	DEUTSCH	1
○	7-3		QQTG0190A	ITALIANO	1
○	7		QQFGKN2000GA	Operating Instruction Manual, EF	1
○	7-1		QQTG0188A	FRANCAIS	1
○	7-2		QQTG0190A	ITALIANO	1
○	7		QQFGKN2000JA	Operating Instruction Manual, EH	1
○	7-1		QQTG0188A	FRANCAIS	1
○	7-2		QQTG0189A	DEUTSCH	1
○	7-3		QQTG0191A	NERDERLANDS	1
○	7		QQFGKN2000KA	Operating Instruction Manual, EP XH	1
○	7-1		QQTG0187A	ENGLISH	1
○	7-2		QQTG0192A	ESPANOL	1
○	7		QQFGKN2000LA	Operating Instruction Manual, X	1
○	7-1		QQTG0187A	ENGLISH	1
○	7-2		QQTG0192A	ESPANOL	1
○	7-3		QQTG0193A	中文	1
○	7		QQFGKN2000MA	Operating Instruction Manual, XT	1
○	7-1		QQTG0193A	中文	1